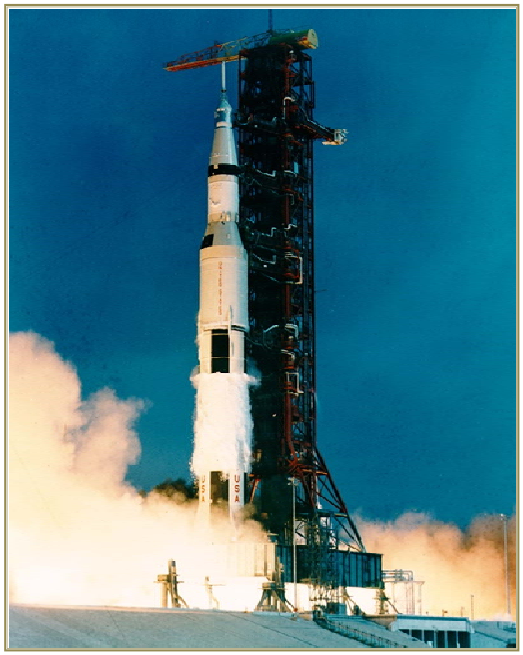
Biz, Bucks & Blastoff

Financial Decision Skills for NV Energy Professionals



Llewellyn Consulting
Consultants to Management

This participant manual is part of Biz, Bucks, & Blastoff – Financial Decision Skills for Electric-Energy Professionals, a two-day course, developed by:

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Version 1.0 (2/21/11) Tailored for NV Energy

Courses in Business Acumen from *Llewellyn Consulting* :

- *Biz, Bucks & Building Organizational Capability (BOC)* for HR Professionals
- *Biz, Bucks & BTUs* for Fossil Power-Plant and Combined Cycle Plant Professionals
- *Biz, Bucks & BRTs* for Nuclear Power-Plant Leadership
- *Biz, Bucks & BRTs for Engs* for Nuclear Plant technical professionals
- *Biz, Bucks & Bucket Trucks* for Electric-Distribution Professionals
- *Biz, Bucks & the Bottom Line* for professionals in any industry

Other Products and Services:

- Strategy Development
- Strategy Implementation
- *Living the Future: A Workshop on Change*

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Front Cover - S69-39525 Liftoff of Apollo 11 July 16, 1969
Page 1-5 – S69-39961 Apollo 11 liftoff from launch tower camera.

LLEWELLYN CONSULTING
CONSULTANTS TO MANAGEMENT

Biz, Bucks, & Blastoff
Table of Contents

Robert N. Llewellyn
Biographical Information

In 1996, Bob Llewellyn formed Llewellyn Consulting, a sole proprietorship focused on building business skills in corporate settings. In addition to consulting in strategy development and implementation, he has designed and delivered the *Biz, Bucks* series of business acumen courses to over 4000 people.

Bob's 39 years of industry experience spans a diverse set of functions. These include both leadership and professional work in engineering, marketing, budgeting, management control systems, compensation and, his passion, organizational effectiveness.

He has an electrical engineering degree from Arizona State University and an MBA from the Executive Program of the Marshall School at the University of Southern California.

Bob has published four articles on various topics of management. Two were selected for SHRM's anthology *HR Magazine: Guide to Managing People*, representing their top papers of the decade.

In 2011, Bob is publishing a full length book, *Leadership for the Recovering Quantoid: A First Book on Boss-hood for Engineers, Accountants, Analysts, Scientists, and Others with Severe Quantoidal Tendencies.*

He and his wife, Marilyn, have six children and fourteen grandchildren. They reside in Phoenix, Arizona. Bob enjoys golf and "harassing" his grandkids. His volunteer efforts have focused on the Boy Scouts of America (as a district commissioner) and church service.

Module

1

The Case for Action

Why Financial Decision Skills?

Two kinds of spending decisions:

1. _____
2. _____

Value Creation for whom?

1. _____
2. _____
3. _____

Value Creation

For whom does a business create value?

- Shareholders
- Customers
- Employees

What does create value mean?

- **Shareholders**—return on investment; maximize wealth; *increase the price of stock*
- **Customer—**value-added products and services
- **Employee—**rewards and job satisfaction

Shareholder Value

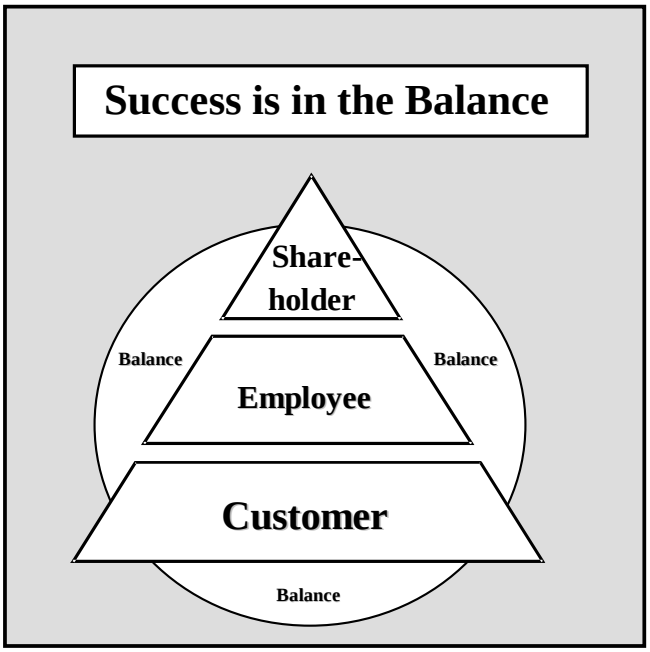
- Shareholders are the *owners* of the business
- Our job is to create value for the shareholder
- A primary goal of a "for-profit" business is to *maximize the wealth* of its shareholders

Why doesn't the company pay us a bunch more $$$s?

The Balancing Act

An eleven-year research study* by two Harvard professors produced this conclusion: *Companies that emphasize all key constituents (shareholders, customers, employees) outperformed firms that did not by a huge margin.*

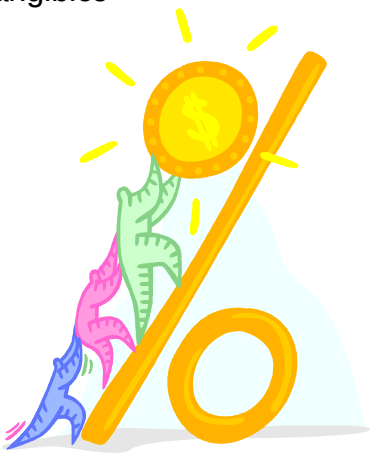
	Balanced vs. S/H only
Revenues	+682% vs. _____
Work Force	+282% vs. _____
Stock Price	+901% vs. _____
Net Income	+756% vs. _____



***** Harvard study: Corporate Culture and Performance by John Kotter and James Heskett, 1992. (Other studies at Stanford and in industry by companies, such as J&J, produced similar results.)

Five Main Objectives of the Course

1. Appreciate balance between employees, customers, & owners
2. Increase understanding of key business tools, concepts, and words
    a. The Word Swamp
    b. The Income Statement
    c. Synonyms of Profit
    d. The Balance Sheet
    e. ROE
    f. Debt - "Boon or Bane"
    g. Bond Ratings
3. Understand rate case basics
4. Build financial decision making skills
    a. Operating vs. Investment Decisions
    b. The Role of Creativity and Innovation
    c. The Role of Intangibles
    d. Effect of taxes (reduction of savings, depreciation)
    e. Time Value of Money
    f. Net Present Value
    g. Relation between NPV and Stock Price
5. Handle uncertainty
    a. Recognize its pervasiveness
    b. Decision Trees
    c. Extending to Intangibles
6. Capstone Case Study: Blastoff
    a. Do NPV Team Competition
    b. Extend Blastoff into three sources of uncertainty
    c. Discuss Intangibles



Biz, Bucks & Blastoff

The final capstone case is about a rocket-engine generating plant, nicked named “Blastoff”.

Course Schedule and Structure

Day 1: Module 1: "The Case for Action"
Module 2: "Business Tools & Concepts"
Module 3: "Rate Case Basics"
Module 4: "Financial Operating Decisions"

Day 2: Module 5: "Financial Investment Decisions"
Module 6: "Handling Uncertainty"
Capstone Case: Blastoff!

Administrative Considerations

- Two breaks in morning
- Two breaks in afternoon
- Lunch provided (45 minutes)

Elect a "Breakmeister"

Mathematic Skills Considerations

Quantoids, Semi Quantoids & _____ People

The participant manual is a WORK book!

Business Tools & Concepts

Module 2

The Business "Word Swamp"

Some "-opoly" Terms

Monopoly

In economics, a **monopoly** (from the Greek *monos*, one + *polein*, to sell) is defined as a persistent market situation where there is only one provider of a kind of product or service. Monopolies are characterized by a lack of economic competition for the good or service that they provide and a lack of viable substitute goods.

Monopoly should be distinguished from monopsony, in which there is only one *buyer* of the product or service; it should also, strictly, be distinguished from the (similar) phenomenon of a cartel. In a monopoly a *single* firm is the *sole* provider of a product or service; in a cartel a centralized institution is set up to partially coordinate the actions of *several independent* providers (which is a form of oligopoly).

Oligopoly

An **oligopoly** is a market form in which a market is dominated by a small number of sellers (oligopolists). The word is derived from the Greek for *few sellers*. Because there are few participants in this type of market, each oligopolist is aware of the actions of the others. Oligopolistic markets are characterised by interactivity. The decisions of one firm influence, and are influenced by, the decisions of other firms. Strategic planning by oligopolists always involves taking into account the likely responses of the other market participants. An oligopy is a form of economy. As a quantitative description of oligopoly, the four-firm concentration ratio is often utilized. This measure expresses the market share of the four largest firms in an industry as a percentage. Using this measure, an oligopoly is defined as a market in which the four-firm concentration ratio is above 40%.

Natural Monopoly

In economics, a **natural monopoly** occurs when, due to the economies of scale of a particular industry, the maximum efficiency of production and distribution is realized through a single supplier.

Natural monopolies arise where the largest supplier in an industry, or the first supplier in a local area, has an overwhelming cost advantage, also known as "first-mover advantage", over other actual or potential competitors. This tends to be the case in industries where capital costs predominate, creating economies of scale which are large in relation to the size of the market, and hence high barriers to entry; examples include water services and electricity. It may also depend on control of a particular natural resource. Companies that grow to take advantage of economies of scale often run into problems of bureaucracy; these factors interact to produce an "ideal" size for a company, at which the company's average cost of production is minimised. If that ideal size is large enough to supply the whole market, then that market is a natural monopoly.

Measuring the Size of a Business

- How do you measure the size of a business?
  - Revenues
  - Net Income (Profit)
  - Assets
  - Units produced
  - Employees
  - Market Capitalization
  - Other

- Determining which company is the biggest can be confusing as it depends on which criterion is used. For example, in 1998:
  - GM had the most revenues ($161B),
  - Microsoft had the largest market capitalization ($418B),
  - Ford had the highest profits ($22B),
  - Citigroup had the most assets ($668B),
  - Wal-Mart had the most employees (910K).

- As a general rule, revenues are used to measure the size of a business.

- *Fortune* Magazine's list of the *Fortune 500* is based upon revenues

  - Market capitalization (market value) is a term heard more and more these days. It is computed by multiplying the number of common shares of stock outstanding by the market price of the stock.

Calculating Market Capitalization (Market Value)

Based on the following data, calculate the market value for these five companies. Do you see anything interesting from your numbers?
(on February 18, 2011)

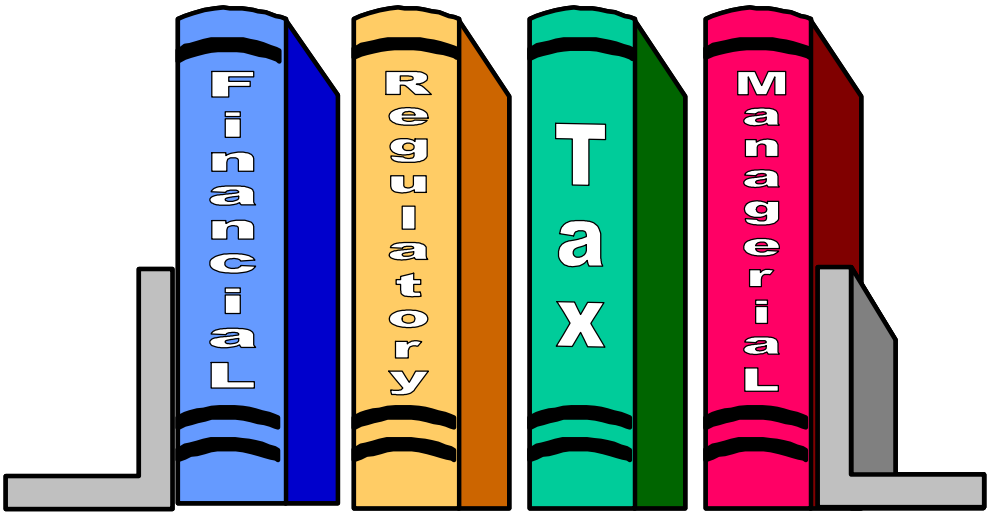
Company	Share Outstanding	Stock Price	Market Cap
NV Energy (NVE)	235.18M	$14.92	
MicroSoft	8.40B	$27.06	
Yahoo	1.31B	$17.66	
GE	10.64B	$21.44	
First Solar (FSLR)	85.72M	$168.22	

The Meltdown

Enron has about 750 million shares of stock. How much market capitalization has it lost in 2001? The starting price was about $90 per share. The ending price was about $6 per share.

Financial Accounting Overview

Four Types of Accounting



	Financial	Regulatory	Tax	Managerial
Purpose:	Investors	Rate Making	Tax Liability	Managing the Business
Whose Rules:	SEC (GAAP)	Commis-sions	IRS	The Firm

The Income Statement:
The First Basic Business Equation

Revenues - Expenses = Profit

what: accounts for revenues & expenses, calculates profit
timing: for a period of time
answers: How much did we earn for the period?

Discussion:

Profit has many synonyms (or near synonyms):

1. _____
2. _____
3. _____
4. _____
5. _____

Typical Format of Income Statement

For Month Ending January 31, 2009 *(a period of time)*:

Sources of Revenues (Sales)
- Product A
- Product B
- Product C
  - Subtotal – all Revenues

Revenue

Types of Expenses (Costs)
- Variable Costs
  - Materials
  - Fuel
    - Subtotal - Gross Margin
- Fixed Costs
  - Salaries
  - Depreciation Expense
  - Advertising
    - Subtotal – EBIT*
  - Interest on Bonds
    - Subtotal – Pre-Tax Margin
- Income Taxes

Expenses

Net Income**

Profit

* Earnings Before Interest and Taxes

** Also known as Profit, Earnings, Returns (to owners), and the 'Bottom line'

Income Statement
Bobby's Bakery
For Year Ending December 31, 2009
($000)

Revenues from Sales	$135.0
Expenses:	
Variable (COGS)	(33.0)
Gross Margin	102.0
Salaries & Benefits	(68.0)
Supplies	(4.0)
Depreciation	(2.0)
EBIT	28.0
Interest	(1.6)
Pre-Tax Margin	26.4
Income Taxes @ 40%	(10.6)
Net Income	15.8
Dividends	(1.8)
Adder to Retained Earnings	14.0

Depreciation

The process of allocating the cost of a long-term asset over the life of the benefit of the asset.

Many methods are used to depreciate an asset. The straight-line method takes the acquisition price (minus estimated salvage) for the asset and divides by the estimated life. The resultant amount is recorded each year as depreciation expense on the income statement with corresponding entry into accumulated depreciation on the balance sheet. **Depreciation is a non-cash transaction**.

Other more sophisticated methods are used in business. The accelerate the depreciation in the earlier years.

Depreciation is an issue of original-cost allocation. It is not the market value of an asset as it "wears out".

Exercise 2.1: Straight-Line Depreciation

A delivery truck costs $25,000 and is estimated to have a seven-year life. The truck is expected to have a $4000 salvage value. Using straight-line depreciation, what is the annual depreciation expense for the truck?

Can you calculate from this data the market value in two years?

Depreciation Tax Shield

Although depreciation itself is a non-cash expense, it does have an effect on cash because of tax considerations. If depreciation expense for a period is $1000, taxes are reduced by that amount *times* the marginal tax rate. If the tax rate is 40%, the firm is shielded from $400 of taxes, increasing its cash flow by that amount.

Revenue	$5000	$5000
Expense w/o Depr.	(3000)	(3000)
Depreciation	--0--	(1000)
Operating Income	2000	1000
Taxes @ 40%	(800)	(400)
Net Income	$ 1200	$ 600
Non-Cash Addback	--0--	1000
Increase in Cash	$1200	$1600

Tax Shield: $400
($1000 x 40%)

Exercise 2.2: Calculating the Depreciation Tax Shield

Revenue	$10000	$10000
Expense w/o Depr.	(7000)	(7000)
Depreciation	--0--	(1200)
Operating Income	3000	
Taxes @ 35%	(1050)	
Net Income	$ 1950	
Non-Cash Addback	--0--	
Increase in Cash	$1950	$

Tax Shield: $
($___ x __%)

Exercise 2.3: Build an Income Statement

Beetburner Power Company is a small generating company which has one generating unit and fifty staff people. Their unit is 150 MW, old vintage, and gas-fired with a heat rate of 10,000 BTU/KWh. They have fixed costs of $7,650,000 for labor and $900,000 of other fixed cost. Their tax rate is 40%.

The market paid them $65 per MWh for power sold into the grid. Their capacity factor was 75%.

[This income statement neglects depreciation and certain other costs.]

Calculate their revenue and complete the income statement for Beetburner.

Beetburner Power Company
Income Statement

Revenue	
Variable Cost	$ (41,391,000)
Gross Margin	
Fixed Cost	
EBIT	
Interest	$ (4,000,000)
Pre Tax Margin	
Taxes	
Net Income	

NV ENERGY, INC.
CONSOLIDATED INCOME STATEMENTS
(Dollars in Thousands, Except Per Share Amounts)

	Year Ended December 31,		
	2009	**2008**	**2007**
OPERATING REVENUES	$ 3,585,798	$ 3,528,113	$ 3,600,960
OPERATING EXPENSES:			
Fuel for power generation	881,768	1,039,267	837,355
Purchased power	758,736	974,343	1,036,905
Gas purchased for resale	153,607	170,468	150,879
Deferred energy	289,076	(10,265)	321,973
Other operating expenses	453,413	394,019	379,446
Maintenance	102,309	94,069	99,035
Depreciation and amortization	321,921	260,608	235,532
Taxes other than income	60,885	53,525	50,113
Total Operating Expenses	3,021,715	2,976,034	3,111,238
OPERATING INCOME	564,083	552,079	489,722
OTHER INCOME (EXPENSE):			
Interest expense (net of AFUDC-debt:			
2009-$20,229; 2008-$29,527; 2007-$25,967)	(334,314)	(300,857)	(279,788)
Interest income (expense) on regulatory items	(2,280)	5,255	26,154
AFUDC-equity	24,274	38,441	31,809
Carrying charge for Lenzie	-	-	16,080
Gain on sale of investment	-	-	1,369
Other income	33,122	34,278	24,580
Other expense	(26,498)	(24,955)	(25,076)
Total Other Income (Expense)	(305,696)	(247,838)	(204,872)
Income Before Income Tax Expense	258,387	304,241	284,850
Income tax expense (Note 10)	75,451	95,354	87,555
NET INCOME	$ 182,936	$ 208,887	$ 197,295
Amount per share basic and diluted (Note 15)			
Net Income per share basic and diluted	$ 0.78	$ 0.89	$ 0.89
Weighted Average Shares of Common Stock Outstanding - basic	234,542,292	234,031,750	222,180,440
Weighted Average Shares of Common Stock Outstanding - diluted	235,180,688	234,585,004	222,554,024
Dividends Declared Per Share of Common Stock	$ 0.41	$ 0.34	$ 0.16

The accompanying notes are an integral part of the financial statements.

NV ENERGY, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(Dollars in Thousands)

	For the Year Ended December 31,		
	2009	**2008**	**2007**
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net Income	$ 182,936	$ 208,887	$ 197,295
Adjustments to reconcile net income to net cash from operating activities:			
Depreciation and amortization	321,921	260,608	235,532
Deferred taxes and deferred investment tax credit	111,219	52,060	79,337
AFUDC-equity	(24,274)	(38,441)	(31,809)
Deferred energy	306,406	2,717	309,587
Carrying charge on Lenzie Generating Station	-	-	(16,080)
Reinstated interest on deferred energy	-	-	(11,076)
Gain on sale of investment	-	-	(1,369)
Other, net	(2,004)	100,482	71,543
Changes in certain assets and liabilities:			
Accounts receivable	12,733	39,776	(19,276)
Materials, supplies and fuel	465	(7,908)	(13,725)
Other current assets	8,335	(6,724)	1,639
Accounts payable	(31,888)	(12,028)	42,958
Accrued retirement benefits	(20,080)	(79,242)	(75,820)
Other current liabilities	(17,287)	40,747	22,475
Risk management assets and liabilities (Note 9)	5,058	(4,924)	10,088
Other deferred assets	(13,831)	(51,874)	498
Other regulatory assets	(69,937)	(67,460)	(45,864)
Other deferred liabilities	(18,251)	22,238	(2,112)
Net Cash from Operating Activities	751,521	458,914	753,821
CASH FLOWS USED BY INVESTING ACTIVITIES:			
Additions to utility plant (excluding AFUDC-equity)	(843,132)	(1,535,503)	(1,165,517)
Customer advances for construction	(8,369)	(11,981)	8,230
Contributions in aid of construction	76,940	62,521	32,165
Proceeds from sale of investment	-	-	1,935
Investments and other property - net	(26,061)	4,301	2,810
Net Cash used by Investing Activities	(800,622)	(1,480,662)	(1,120,377)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from issuance of long-term debt	1,418,872	2,135,151	1,246,383
Retirement of long-term debt	(1,271,350)	(1,114,226)	(1,044,866)
Sale of Common Stock	6,051	5,756	213,339
Proceeds from exercise of stock options	-	-	548
Dividends paid	(96,125)	(79,714)	(35,417)
Net Cash from Financing Activities	57,448	946,967	379,987
Net Increase (Decrease) in Cash and Cash Equivalents	8,347	(74,781)	13,431
Beginning Balance in Cash and Cash Equivalents	54,359	129,140	115,709
Ending Balance in Cash and Cash Equivalents	$ 62,706	$ 54,359	$ 129,140

SUMMARY of TWO Tax Effect from the Income Statement

- PT/AT Principle: Savings (and costs) are REDUCED by 40%!
  (Multiply by 60%)

- DTS Principle: Capital Costs provide a Depreciation Tax Shield!
  (Depreciation Expense x Tax Rate = DTS) (Multiply by 40%)

The Balance Sheet:
The Second Basic Business Equation

Assets = Liabilities + Owner's Equity

Assets: Things that help the firm generate cash flow, such as cash, inventory, plant and equipment, land, and accounts receivable.

Equity: A claim on an asset, generally in two broad categories: claims by creditors, called liabilities, and claims by owners.

what:	accounts for the firm's assets, liabilities, and owner's equity
timing:	at a point in time
answers:	What do we have and who owns it?

Discussion: "Net Worth" Statement

Often when buying and then financing a new car, you are asked to fill out a Net Worth Statement.

How much do you own?

How much do you owe?

Subtract and that's your NET WORTH!!

Discussion: Your New Home "Balance Sheet"

Asset = Liability + Equity

Original Price:

One day later:

Balance Sheet
Bobby's Bakery
For December 31, 2009
($000)

Assets	
Cash	$ 50
Inventory	20
Accts Receivable	3
Sub total – Current	$ 73
PPE	50
Accum. Depr.	(23)
TOTAL Assets	$100

Liabilities	
Accts Payable	$ 5
Bonds	20
TOTAL Liabilities	$ 25

Owner's Equity	
Common Stock	$ 35
Retained Earnings	40
TOTAL Owners Equity	$ 75

TOTAL Liabilities Plus Owner's Equity	$100

These two values must always equal (balance).

Book Value:

1) **Total Assets minus Total Liabilities** - The accounting assessment of the value of the firm. It is not the market's assessment of that value. The market assessment of a publicly held firm's (common equity) value is its share price times the number of shares.
2) **Original Cost minus Accumulated Depreciation** - The value on the books of a particular item of PPE, such as a vehicle.

NV ENERGY, INC.
CONSOLIDATED BALANCE SHEETS
(Dollars in Thousands)

	December 31, 2009	December 31, 2008
ASSETS		
Current Assets:		
Cash and cash equivalents	$ 62,706	$ 54,359
Accounts receivable less allowance for uncollectible accounts:		
2009 - $32,341, 2008 - $32,884	400,911	410,184
Deferred energy (Note 3)	-	50,436
Materials, supplies and fuel, at average cost	124,040	124,271
Risk management assets (Note 9)	27,558	16,118
Current income taxes receivable	-	5,487
Deferred income taxes (Note 10)	87,562	49,996
Other current assets	44,298	52,633
Total Current Assets	747,075	763,484
Utility Property:		
Plant in service	10,833,622	10,175,741
Construction work-in-progress	716,128	605,163
Total	11,549,750	10,780,904
Less accumulated provision for depreciation	2,884,199	2,603,287
Total Utility Property, Net	8,665,551	8,177,617
Investments and other property, net (Note 4)	51,169	25,181
Deferred Charges and Other Assets:		
Deferred energy (Note 3)	138,963	231,027
Regulatory assets (Note 3)	1,218,778	1,415,286
Regulatory asset for pension plans (Note 3)	264,892	413,544
Risk management assets (Note 9)	6,732	9,959
Other deferred charges and assets	173,145	169,266
Total Deferred Charges and Other Assets	1,802,510	2,239,082
Assets Held for Sale (Note 16)	147,158	142,506
TOTAL ASSETS	$ 11,413,463	$ 11,347,870

(Continued)

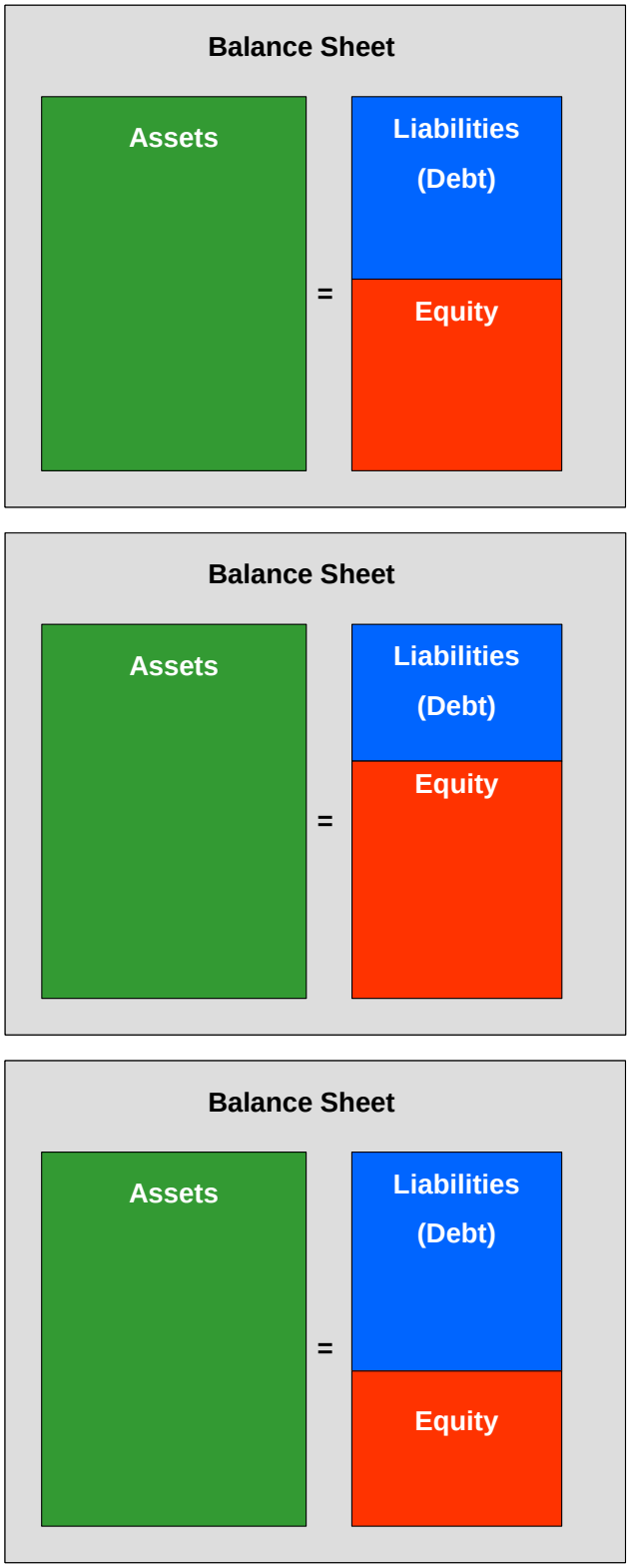
NV ENERGY, INC.
CONSOLIDATED BALANCE SHEETS
(Dollars in Thousands)

	December 31, 2009	December 31, 2008
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current Liabilities:		
Current maturities of long-term debt (Note 6)	$ 134,474	$ 9,291
Accounts payable	352,000	400,084
Accrued expenses	134,328	131,720
Risk management liabilities (Note 9)	66,871	313,846
Deferred energy (Note 3)	191,405	28,546
Other current liabilities	67,301	87,060
Total Current Liabilities	946,379	970,547
Long-term debt (Note 6)	5,303,357	5,266,982
Commitments and Contingencies (Note 13)		
Deferred Credits and Other Liabilities:		
Deferred income taxes (Note 10)	1,072,780	920,481
Deferred investment tax credit	22,541	25,923
Accrued retirement benefits	149,925	288,841
Risk management liabilities (Note 9)	2,233	53,403
Regulatory liabilities (Note 3)	386,019	350,526
Other deferred credits and liabilities	280,560	315,881
Total Deferred Credits and Other Liabilities	1,914,058	1,955,055
Liabilities Held for Sale (Note 16)	25,747	24,100
Shareholders' Equity:		
Common stock	234,834	234,317
Other paid-in capital	2,700,329	2,694,792
Retained earnings	295,247	208,437
Accumulated other comprehensive loss	(6,488)	(6,360)
Total Shareholders' Equity	3,223,922	3,131,186
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	$ 11,413,463	$ 11,347,870

The accompanying notes are an integral part of the financial statements.

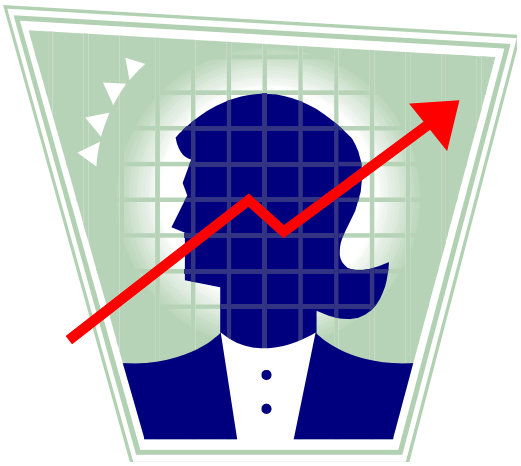
(Concluded)

Debt vs. Equity Ratios



Exercise 2.4: ROE Calculation

Return on Equity (ROE) is a common measure of profitability for firms. It is one of several ratios used to analyze results of firms. Using the data displayed previously, please calculate the ROE.



The Cost of Capital

The minimum acceptable rate of return of an investment, as seen by a rational investor. The cost of capital will be used extensively in a later module.

Cost of capital is made up of three components: the real cost of money, the anticipated inflation for the investment period, and the risk of the investment.

For an entire firm, the cost of capital is the weighted average of all sources of capital. This is called the Weighted Average Cost of Capital (WACC).

For an investment made by a firm, like a factory betterment project, the cost of capital should be based on the cost of capital of the investment, not on the firm making the investment. The risk of the investment may differ from that of the firm making the investment. Therefore, the cost of capital should also differ. However, for projects that have about the same level of risk as the company making the investment, the WACC is often used as the cost of capital.

The cost of capital must include all types of investments in the company. For simplification, we will use only two: bonds and common stock. Preferred stock is another type of investment that would be included in practice.

Exercise 2.17 Weighted Average Cost of Capital

Calculate the weighted average cost of capital for Bobby's Bakery if the bond has a 8% coupon and the tax rate is 40%. The stock market is asking for 12% return on equity for similar type companies. The "weighting" is based on the debt ratio and equity ratio calculated earlier.

Exercise 2.5: Leverage -- Boon or Bane?

	Good Year		Bad Year	
	w/o leverage	w/ leverage	w/o leverage	w/ leverage
Capital Structure:				
Debt Financing	-0-	$50	-0-	$50
Common Stock	$100	$50	$100	$50
Income Statement:				
Revenue	$200	$200	$60	$60
Variable Costs @ 80%				
Margin				
Fixed Costs @ $10k				
EBIT				
Interest @ 8%				
Taxes @ 40%				
Net Income				
Return on Equity (ROE)				

Some Advantages of Debt

1. Leverage can increase profitability to shareholders in good years
2. Debt holders do not share in value created
3. Interest payments are tax deductible
4. Issue costs are typically lower

Some Disadvantages of Debt

1. Leverage can decrease profitability to shareholders in bad years
2. Increased financial burden, risk of bankruptcy and liquidation
3. Raises cost of equity capital
4. Restricts flexibility, may lead to capital rationing
5. Real cost of debt is higher if inflation drops

Debt Ratios Drive a Company's Bond Rating

Moody's	S&P	Definition
Aaa	AAA	Best Quality
Aa1 Aa2 Aa3	AA+ AA AA-	Very high quality
A1 A2 A3	A+ A A-	High quality
Baa1 Baa2 Baa3	BBB+ BBB BBB-	Medium Grade
Ba1 Ba2 Ba3	BB+ BB BB-	Low Grade somewhat speculative
B1 B2 B3	B+ B B-	Very Speculative
Caa	CCC	Substantial Risk
Ca	CC	Very poor quality
C	D	Imminent default or in default

Capital & O&M: Definitions

To understand costs, one more accounting topic is useful:

Capital – (from a budgeting viewpoint) Expenditures that are charged to plant-in-service accounts. This includes the cost of labor for design, construction, and startup; contractors; equipment; materials; and any ad valorem (property) taxes.

Plant-in-service items are things that will help produce, transport, or distribute products to our customers. They also include items that indirectly support these three functions, such as, offices, furniture, computers, vehicles, tools, etc. so long as those items are useful for an extended period of time (typically beyond one year).

Capital expenditures are booked initially to asset accounts on the balance sheet. They are depreciated over the life of the asset. The depreciation is charged to depreciation-expense account on the income statement.

O&M – Expenditures to operate or maintain the plant-in-service or to service customers. This includes costs of labor, contractors, fuel, etc. These are expensed directly to the income statement as they are made and, therefore, come directly off of the bottom line (net income).

An Important Question:

Is depreciation of capital an issue of earnings or cash flow?

Exercise 2.6: What Type of Cost is It?

Mark a “C” for capital, “O” for O&M, or a “U” if undetermined.

1. _____ Cost of a new large pump
2. _____ Labor to fix a minor problem on a line truck
3. _____ A substation transformer
4. _____ A bolt in the warehouse inventory
5. _____ Control-Room Operator labor
6. _____ Engineering costs for transmission line upgrade
7. _____ Spare pump in the warehouse
8. _____ Labor for an auxiliary operator
9. _____ A pencil
10. _____ A “big pink” eraser
11. _____ Survey cost for a transmission line upgrade
12. _____ Engineering for a cancelled transmission line upgrade

The Rate Case: Basics & Beyond

Module 3

What is a Rate Case?

It just works backwards up an income statement. Instead of trying to maximize profits (the bottom line), rate cases are focused on minimizing revenue from customers (the top line) while maintaining value of the shareholders investment. A rate case is based on a test year plus forecasts for the future.

INCOME STATEMENT for TEST YEAR			
Revenue			$ 870
Expenses:			
	Fuel	$ (160)	
	Operations	$ (141)	
	Maintenance	$ (111)	
	Depreciation	$ (147)	
	subtotal (Cost of Service)	$ (559)	$ (559)
	EBIT		$ 311
	Interest		$ (104)
	Pre Tax Margin		$ 207
	Income Taxes		$ (83)
Net Income			$ 124
	ROE		9.6%

BALANCE SHEET for TEST YEAR					
Assets			Liabilities and Owner's Equity		
Plant (Orig. Cost)	$ 3,800			Stock	$ 702
Const Work in Prog	$ 114			Retrained Earnings	$ 598
Less: Accum Depreciation	$ (1,252)			Total Owner's Equity	$ 1,300
"Rate Base" Subtotal*	$ 2,662				
Current Assets	$ 187			Long Term Debt	$ 1,350
Total Assets	$ 2,849			Total Capitalization	$ 2,650
* Rate Base will also include Working Capital				Current Liabilties	$ 199
				Total	$ 2,849

Rate Case Exercise

This case is simplified. Actual rate cases use specific formats for electric utilities. This case is based on the simplified format like Bobby's Bakery financial statements.

Refer to the following page. All dollars are in millions.

The test year income statement is shown.

Here are some assumptions for this rate case:

1. The Long Term Debt rate is 8%.
2. The Equity return rate of 10% of New Rate Base is allowed by the regulatory agency.
3. Wages are forecasted to increase $9 for the next twelve months, with $5 for operations and $4 for maintenance.
4. Fuel in NOT passed through for this regulatory agency. Fuel is forecasted to increase $4 for the next twelve months.
5. The new rate base includes an amount for "working capital". This regulatory agency allows one eighth of the total of fuel, operations, and maintenance expenses for the test year as working capital. Working capital is added to the normal parts of the rate base (Plant, CWIP, and Accumulated Depreciation).
6. Assume there is $75 change to the plant in service for the following year.

What are the biggest issues in a Rate Case?

1. _____
2. _____
3. _____
4. _____

INCOME STATEMENT for TEST YEAR				
	Revenue			$ 870
	Expenses:			
		Fuel	$ (160)	
		Operations	$ (141)	
		Maintenance	$ (111)	
		Depreciation	$ (147)	
	subtotal (Cost of Service)		$ (559)	$ (559)
		EBIT		$ 311
		Interest		$ (104)
		Pre Tax Margin		$ 207
		Income Taxes		$ (83)
	Net Income			$ 124
		ROE		9.6%

New INCOME STATEMENT							
						increase	% incr
	Revenue						
	Expenses:		change	New Total			
		Fuel					
		Operations					
		Maintenance					
		Depreciation					
		subtotal (Cost of Service)					
		EBIT					
		Interest					
		Pre Tax Margin					
		Income Taxes					
	Net Income						
		ROE					

Where does the New Net Income come from?

			Fuel	Ops	Maint	subtotal	1/8			
1. Calculate the working capital										
2. Calculate Rate Base by using Test Year										
		Plant (OC)								
		CWIP								
		Working Cap.								
		Accum Dep								
		New Rate Base								
3. Calculate Cost of Debt (Interest)										
		Cost of Debt	8%							
Debt portion of New Rate Base				(Assume the new working capital is financed by equity only.)						
4. Calculate the Cost of Equity (New NET INCOME)										
		Cost of Equity	10%		New RB	Debt Portion				
Equity Portion of New Rate Base										
		New Net INCOME		(Cost of Equity)						
5. Equity portion of Rate Base without Working Capital										
Equity Portion of New Rate Base										
		minus WC								
		Non Current Assets wo WC								

How do you improve the company's finances?

- Improve effectiveness with internal and external customers
- Improve efficiency of operations
- Reduce risk

....so how do you do that?

- Improve business processes
- Manage projects well
- Be innovative
- Communicate x 10
- Tie everything to strategy

Innovation

Innovation = _____ + _____

From Wikipedia, the classic definitions of innovation include:

1. the process of making improvements by introducing something new
2. the act of introducing something new: something newly introduced (The American Heritage Dictionary).
3. the introduction of something new. (Merriam-Webster Online)
4. a new idea, method or device. (Merriam-Webster Online)
5. the successful exploitation of new ideas (Dept of Trade and Industry, UK).
6. change that creates a new dimension of performance (Peter Drucker, Hesselbein, 2002)

Discussion: Action Implies the Ability to Implement

- Project Management Skills
- Process Management Skills
- Communication Skills
- Presentation Skills
- Team Skills

What's a Project?

What's a Process?

What's a Team?

Process Management

Exercise: The Potential in Managing Your Work Processes

1. On the following form, chart the steps for D-Biz, Inc. to fulfill a request for a new, residential customer connection. Estimate the cost of one cycle of this process. The customer is advised to use a time-of-use rate.

Dept.	Activity	Cost
Customer		
Call Center		
Meter Shop		
Serviceman		
Billing		
Advocate		
	Estimated Total Cost of One Process Cycle (no errors):	

What is the probability that each step of this process is done right the first time?

Exercise: Doing It Right the First Time (continued)

2. Repeat 1. Above, charting the steps of the residential-connect process, assuming one activity is done in error and the wrong meter is installed.

Dept.	Activity	Cost
Customer		
Call Center		
Meter Shop		
Serviceman		
Billing		
Advocate		
	Estimated Total Cost of One Process Cycle (one error):	

Exercise: Doing It Right the First Time (continued)

6. Using the following table, calculate the weighted average cost of this process for D-Biz, Inc.? [Use the answer in #2. Above as the weighting factor.]

FPY is ___%	Cost	Weight	Weighted Cost
No errors			
One error			
		TOTAL	

7. If D-Biz, Inc. can improve the FPY to _____%, what is the percent improvement for this process?

FPY is ___%	Cost	Weight	Weighted Cost
No errors			
One error			
		TOTAL	

$$Percent\ Change: \quad \frac{Cost\ with\ New\ FPY}{Original\ Cost} - 1$$

Learnings: _____

_____

_____

Stories of Creativity and Innovation

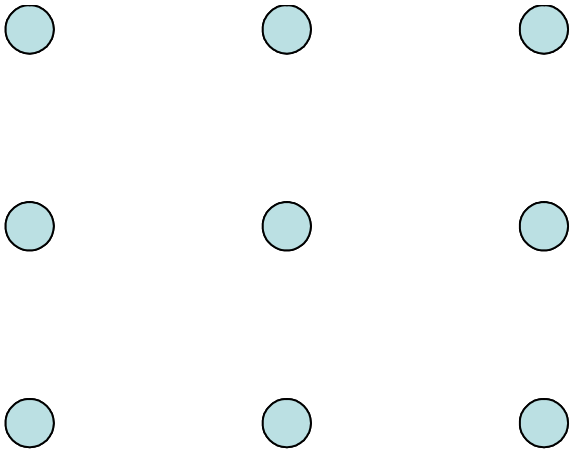
1. The Lipstick on the Mirror
2. The Country-Club Shampoo
3. _____
4. _____

Lessons to be learned:

1. _____
2. _____

A “Right Brain” Exercise: Nine Nice Dots

Connect all nine dots with four straight lines without taking your pen off the paper. [It can be done!]



Discussion: If your company does NOT have an innovative culture, whose fault is it?

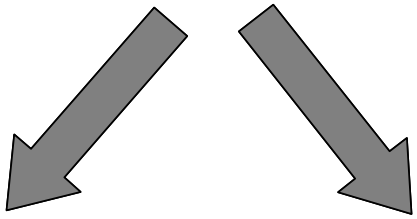
Notes

Financial Operating Decisions

Module 4

Spending Decisions

Two types



Operating Decisions

- Short - term effects
- Quicker decisions
- Module 4

Investment Decisions

- Long - term effects (years)
- Some time to ponder
- Module 5

An Important Conversion

To Convert from $/MWh to ¢/KWh, divide by _____. The “wires” part of electric utilities primarily uses the latter units. The “plants” use the former.

Basic Dispatching Economics

1. What is the fuel cost to generate one MWh if the cost of coal is $1.5/mmBTU delivered and the heat rate of the station is 10,000 BTU/KWh?

2. What is the fuel cost of generation per MWh if the cost of gas is $7/mmBTU at an efficient combined cycle combustion turbine station that has a heat rate of 7,000 BTU/KWh?

3. What is the fuel cost of generation per mwh if the cost of gas is $7/mmBTU at a less efficient simple cycle combustion turbine that has a heat rate of 14,000 BTU/KWh?

Which unit of the three gets dispatched first?

Dispatch the lowest variable cost asset first!

A merchant generating company has only two plants. They can dispatch either.

Thompson has variable cost of $13/MWH and a fixed cost of $22/MWH.

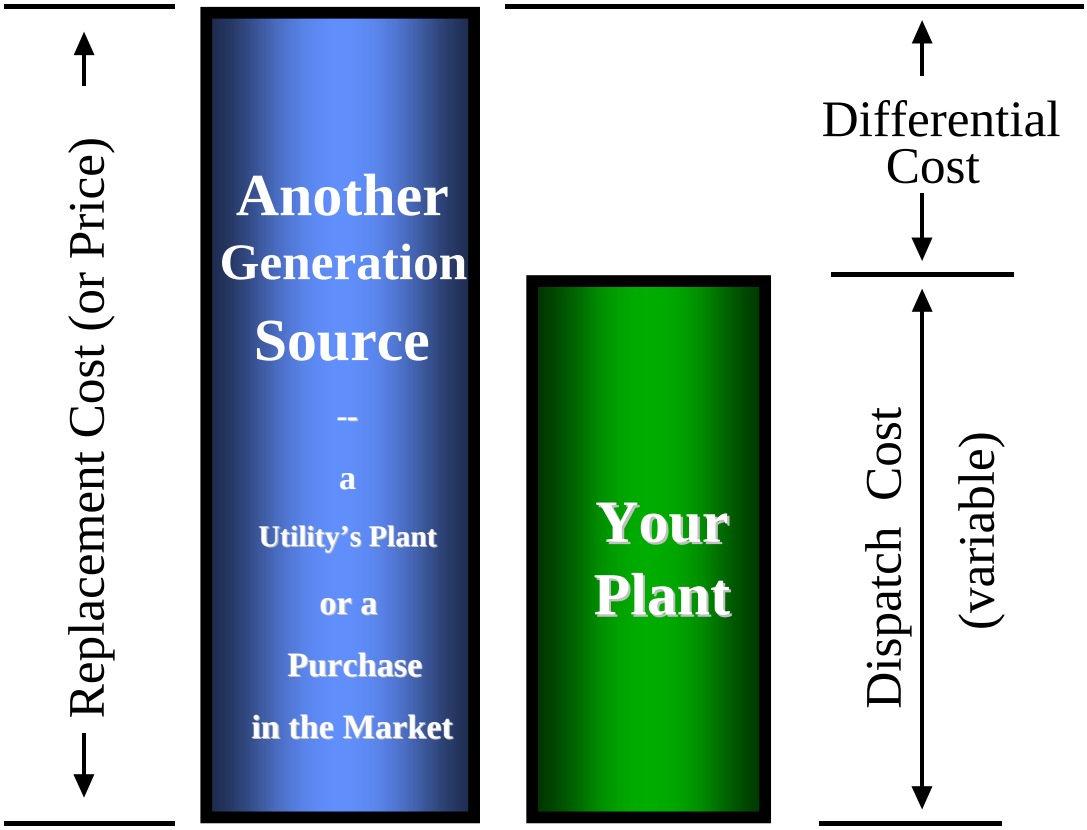
Bolley has a variable cost of $11/MWH and a fixed cost of $33/MWH.

(Assume they will have the same MWH this year.)

Only one plant is needed immediately. Which one should be dispatched first? Assume each plant will make $71/MWH revenue.

	If Thompson Runs	If Bolley Runs
Revenue		
Variable		
Fixed		
Profit		

Differential Cost Decisions



An Overtime vs. Differential Decision

You have a boiler-feed pump that needs repair on Candle Plant, Unit 2. Without it, Unit 2 loses 100 MW. It is Friday afternoon. Dispatching confirms the unit is not needed until Monday, but full load is needed then. Purchased power will have to be used otherwise. It is estimated that it will take ten hours to repair the pump using three mechanics (30 total hours).

Assume:

- $25 per MWh for replacement power for 10 hours on Monday
- $21 per MWh for Candle 2 dispatch cost
- $21.94 per straight-time hour for maintenance mechanics
- The job could be done on Monday with available crews (coverage is sufficient)
- Coverage is not sufficient on the weekend
- Disregard FICA considerations.

When do you repair the pump:

A. On the weekend, using overtime (1-1/2)?
B. On Monday, without overtime?

A "Best for Whom?" Problem

D-Biz, Inc. has developed a problem with delinquent customers. In the past, D-Biz has simply disconnected them after a lengthy period of empathy, warning, cajoling, and threatening. A recent study of a random sample of delinquent customers has shown IF D-Biz will simply hang a final warning notice on their front door, many such customers will call immediately and arrange for a payment plan. This simple approach saves D-Biz from the trip out to disconnect service. That however is mostly off set by the trip out to hang the bill hanger. Credit and Collections Department estimate a substantial savings in bad debt write-offs. This is the big reason to implement this procedure throughout D-Biz's service territory.

D-Biz has 650,000 residential customers. About 0.15% become seriously delinquent annually. An average amount due is $450. The bill hanger study showed an improved response in 19% of the cases over a control group. That is 19% fewer delinquent customers abandon the premises and are never found.

To place the bill hangers, the customer office will need to supply a full time contractor on an as needed basis at a rate of $25 per hour (loaded). The bill hanger can place one bill hanger every 30 minutes.

Part A: Calculate the increased cash inflow from this procedure. Calculate the cost (cash outflow) to implement this procedure. What is the annual net cash inflow for this innovation? Neglect printing costs.

Part B: Whose budget gets the improved cash inflow? Whose budget gets the additional cost (cash outflow)?

Sub-Optimization!!!

Not working from a total-company perspective,
i.e. doing what is best for a business unit,
not for the greater good of the company

How Many Distinct Businesses in T, D & CS?

Part A - The typical transmission, distribution and customer service functions in an electric utility are made up organizational units which could exist in a free market as a separate companies with revenues, expenses, and, possibly, profits. What major parts of T, D & CS could be their own business?

a) _____

b) _____

c) _____

d) _____

e) _____

Part B – Which of the above businesses have high fixed cost? Which have high variable cost? Which are a mixture of both, similar to a power plant?

Part C – What are the advantages and problems with such cost structures (variable vs. fixed)?

Remember: variable costs vary proportionately with the output of the business

Notes

Financial Investment Decisions

Module 5

Theory and Background

This topic has several names: *Project Evaluation, Investment Analysis*, and *Capital Budgeting.* The last one causes confusion in utilities where the term *capital budgeting* implies the rolling up of an annual spending plan for those items that will be added to plant-in-service. In the academic definition, *capital budgeting* refers to the decision making process which approves or rejects investments of all types, including software development, training and other intangibles, mergers, acquisitions, and divestitures.

Why Learn the Principles of Investment Decisions?

1. You get more ideas accepted
2. You are better prepared for more responsible positions
3. You better understand why things are being done the way they are
4. You learn how to help create value for shareholders
5. You can make better personal decisions

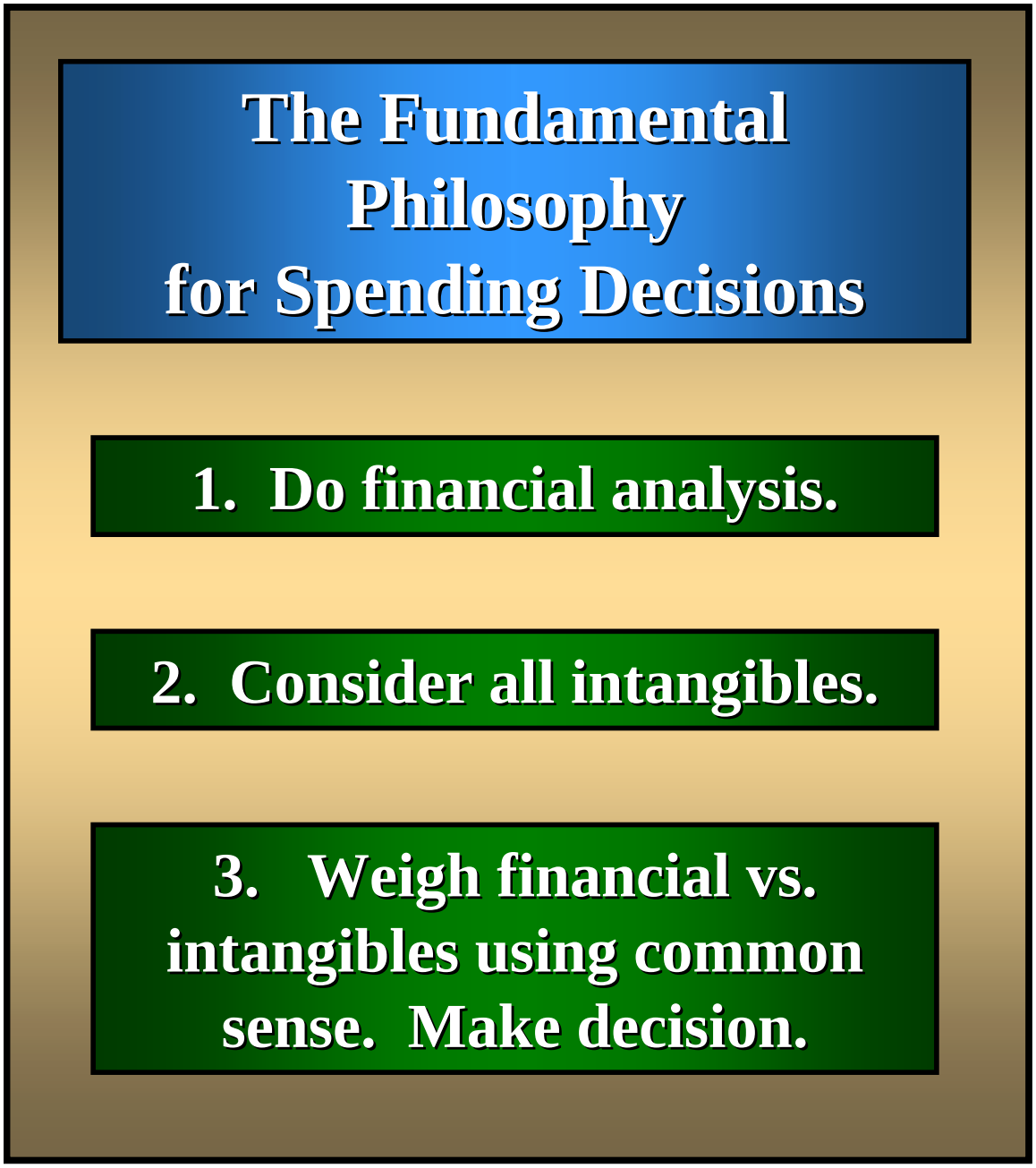
Exercise 5.1: What is an Investment?

A purchase that is intended to create value for its owner.

Examples:

-
-
-
-
-

The Fundamental Philosophy



Strategic Intangibles

Strategic Intangibles

- Nuclear Safety
- Customer Satisfaction (internal and external)
- Employee Satisfaction and Developm't
- Brand Equity
- Infrastructure
- Environment
- Regulatory
- Safety
- Community
- Earnings (not cash)

Regarding the Financial Quantification:

The Basic Rule for Financial Analysis

Consider only:

Future…

Cash Flows…

Which Vary…

Between Alternatives.

When using Cash for decision making, as opposed to earnings, there is no difference between capital and expense!

Doing a Financial Analysis

A. Find all alternatives. Compare each to the base or “do nothing” alternative. Seek the GREAT ALTERNATIVE!

B. To do the comparison, use the with and without rule and draw a timeline of the cash flows

For the proposed alternative and the base alternative:

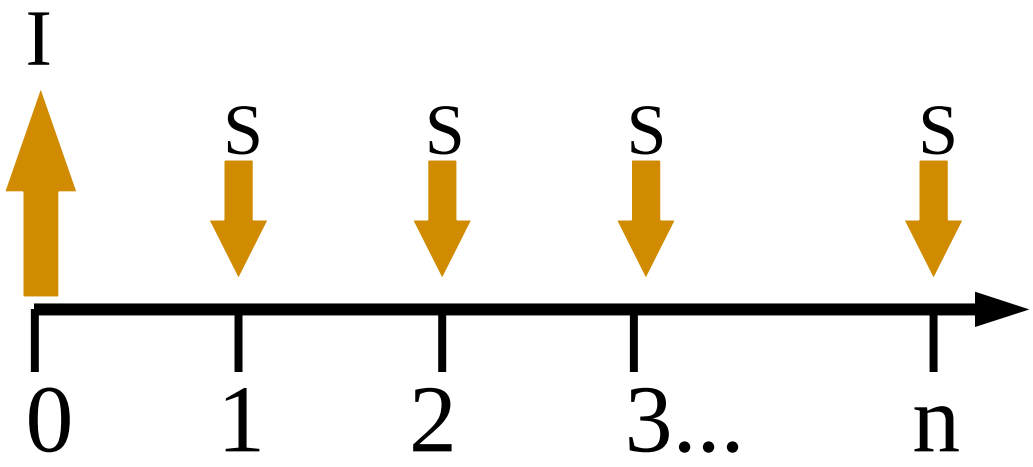
a) Recall the Basic Rule: Future…cash flows…which vary…between alternatives
b) Draw the timeline(s) (either one line or three lines)
c) Estimate the total cost of the investment
d) Estimate the total operating savings (usually annual)
e) Determine the yearly cash flows (values of the arrows). Use the “income statement” format, if necessary, for each year.

C. Apply a financial decision tool (NPV, Payback, etc.).

D. Make the financial part of the decision.

Picturing Investment Decisions

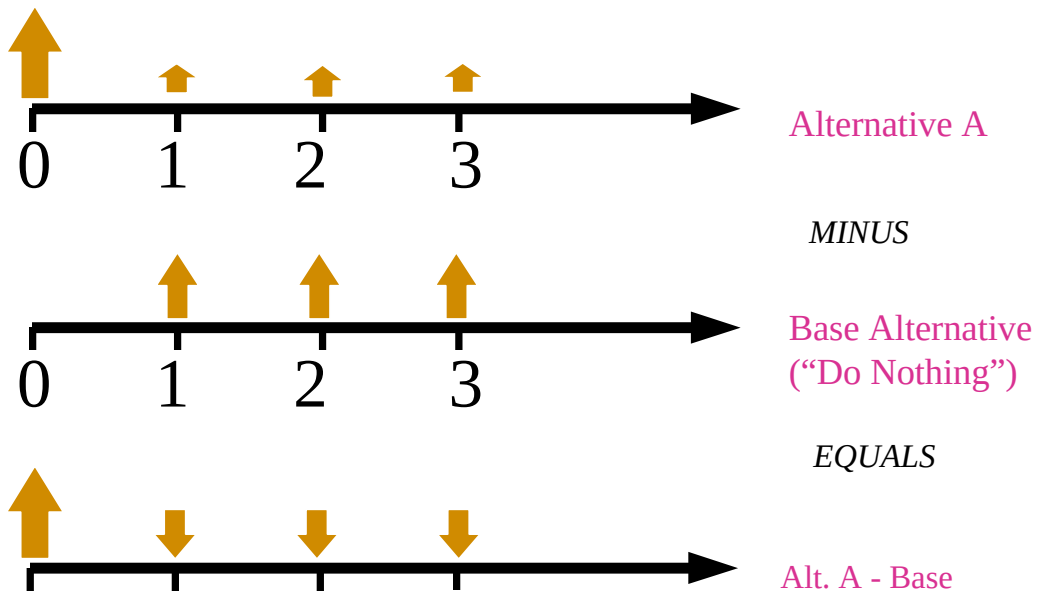
The Simple Timeline Diagram: The Single-Line Format



Cash Outflows: Arrows out of the timeline represent cash flows **out** of the company.

Cash Inflows: Arrows into the timeline represent cash flows **into** the company.

Where the Simple Timeline Comes From: The Three-Line Format



This three-timeline format represents the "WHICH VARIES" part of the Basic Decision Rule: Future…Cash Flows…*which varies*…between alternatives.

For some investment problems, the data will be sufficient to directly draw the single timeline diagram. For other problems, all three timelines will be needed.

This method of visualizing investments helps to understand the cash flows involved in an investment decision. The simple timeline diagram is a picture of the cash inflows and the cash outflows.

Exercise 5.2: Drawing Pictures of Investment Decisions

This exercise introduces a method of picturing investments. It establishes a convention for this course. Other conventions are just as useful.

1. A line truck engine overhaul will cost $5,000 and will save $1,000 each year for five years in operating costs.

2. A new IT network innovation will cost $1,500,000 to install, but will save $170,000 per year in operating costs. In year 5, the new system will need a $200,000 upgrade. The equipment is planned to have a ten-year life.

Applying a Financial Decision Tool

There are several tools from which to choose[1]:

Non Time-based:

- Payback
- Return on Investment

Time Value of Money Based:

- Net Present Value (NPV)
- Minimum Annual Revenue Requirements (MARR)
- Internal Rate of Return
- Profitability Index

Payback is a good "back-of-the-pocket" evaluation tool, but has some flaws, among them being it does not handle the time cost of money. It is useful, however, in a teaching situation. Payback will be used as a vehicle to teach some key principles around how to determine correct cash flows in typical real-world investment problems. Then, for this course, it will be abandoned.

Accounting Rate of Return (ROI) is the average (usually for three years) of after-tax profit divided by the investment. It is flawed because it is based on earnings, not cash, and it does not use time-value-of money principles.

Net Present Value (NPV) is the tool of choice to handle most investment decisions. It handles time-value of money and must be understood to understand value creation and the stock market in general. The basic formula is NPV= PVFCF – I. PVFCF is present value of future cash flows. The decision rule is to accept any positive NPV projects.

Minimum Annual Revenue Requirements (MARR) is used by utilities to make decisions based on the customer's perspective in a traditional rate-making environment. It is a good tool for making investment decisions. It includes time-cost-of-money principles, but it represents the traditional thinking of simply getting a rate increase and pass increased costs onto the customer. Therefore, NPV should be preferred to support the necessary change to a competitive culture.

Internal Rate of Return (IRR) is similar to NPV except it calculates the rate of return for the NPV equation to be exactly equal to 0. (NPV= PV of cashflows – I = 0.) Historically, more companies use IRR than any other tool. It is less effective than NPV in some capital rationing situations.

Profitability Index is also similar to NPV. It is the ratio of the Present Value of the cash flows divided by the initial investment. The decision rule, therefore, is to accept any project with PI greater than 1.0. This method is also known as Benefit/Cost Ratio (BCR).

Basic Cash Flow Principles

Payback: Our First and Temporary tool

Philosophy:

Payback shows how long it takes for future periodic savings -- generated by an investment -- to exceed the initial outlay of the investment. The company establishes a hurdle rate. If the payback period is less than the hurdle rate, the investment is recommended.

Source of the Hurdle Rate

For purposes of *Biz, Bucks, & BTUs*, a **three-year hurdle rate** is assumed. Management chooses a hurdle rate based on the financial goals of the business. Lowering the hurdle rate screens out more proposed projects and thus reduces capital budgets. **The payback of three years is assumed to take into account the tax effect on savings.** Taxes are therefore not an issue with payback.

Methodology:

Different mathematical formulas are available to calculate exact moments in time when the payback period occurs. However, different formulas apply in different situations. A more practical approach -- the "Payback Inspection Table [tm]" -- has been developed which should provide clear payback decisions for almost all situations without having to pick an appropriate mathematical formula. Compared to formulas, the table approach is quicker, easier to teach, better handles multiple alternatives, and better acquaints the user with the concept of cash flows.

The Payback Inspection Table™

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

The decision rule is:

If the shaded box is greater or equal to zero, the project is recommended. The project pays back within three years.

Payback Problem 1: A SCADA Upgrade

An upgrade (a new computer system for system energy-flow monitoring and billing) on the SCADA at GOA's Transmission Control Center can reduce one administrative position. The cost of the upgrade is $160,000. An administrative specialist makes $21.42 per hour. The payroll load is 35%. What is your recommendation? Assume 2080 hours per year.

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

Learnings: _____

_____

_____

Payback Problem 2: The New Service Center (Part A)

D-Biz, Inc, an independent distribution utility, is contemplating a new service center which will house a customer service office, some engineering staff, and a construction yard. The service center is planned to be located on the edge of growth in a rapidly developing town in D-Biz's service territory.

Architectural costs are estimated to be $50,000. The cost of construction (materials, labor, etc.) is $250,000.

The financial incentive to build the service center is reduced logistical cost in this high growth area. A local industrial engineering firm, Sly, Drool, and Awelfore, Inc., has calculated the logistical savings to be:

	Year 1	Year 2	Year 3 and Beyond
Logistical Savings	$55,000	$110,000	$165,000

An intangible benefit from building the service center exists. The town council is pro-growth and a 20-year franchise election is coming up in five months. Relationships are good with the town council.

Using payback hurdle rate of three years, is the service center justified financially. Disregard any land considerations.

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

Learnings: _____

_____

_____

Payback Problem 3: The New Service Center (Part B)

D-Biz, Inc. has been concerned about the competence of their industrial engineering firm. Two other IE firms are hired to verify their findings. They both agree the original logistical savings are inflated. More reasonable estimates are:

	Year 1	Year 2	Year 3 and Beyond
Logistical Savings	$45,000	$90,000	$135,000

This information comes to light approximately six months after the decision to proceed was made. The architectural firm has completed the design. Their actual total cost was $45,000. Construction contracts are in the bid stage, i.e., no construction costs have been incurred.

In addition, the franchise election was held three weeks ago. D-Biz Inc. was successful in retaining the franchise for the next 20 years.

From a financial standpoint, using a payback of three years, is the project now financially sound? As before, disregard land considerations.

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

Learnings: _____

_____

_____

Payback Problem 4: The New Service Center (Part C)

This problem addresses the land for the new service center. D-Biz, Inc. purchased the land for the service center for $20,000 ten years ago. The escalation of land prices in the area has been about 10% per year for the last decade.

a. Should this be included in the calculations for the original Part A?

b. For Part B?

c. If it should be included, should it be at the original cost or the escalated cost?

d. For Part B, what does the payback look like if the land was included?

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

Learnings: _____

_____

_____

Lessons Learned from Payback Problems

1. Drawing pictures (time lines) to really understand what varies.
2. Two Terrible Tendencies:
   - estimating low on costs
   - estimating high on savings
3. Disregarding "sunk costs"
4. Sorting out fixed vs. variable costs
5. Including "opportunity costs"
6. Use only hard savings

Fatal Flaws of Payback

- The time value of money is not considered.
- The hurdle rate is arbitrary.
- Cash flows beyond the hurdle rate are not considered.

The "Canceled Job" Dilemma

- When you cancel a capital job, the cost-to-date is expensed to O&M.
- This hurts earnings
- BUT, it is a non-cash expense.

How do you factor this into the decision-making process?

- There is no easy answer…
- You must consider it an intangible concern from a financial analysis perspective.
- Earnings are a real issue, the world still uses it as a measure.

Principles of Net Present Value (NPV)

Which would you rather have?

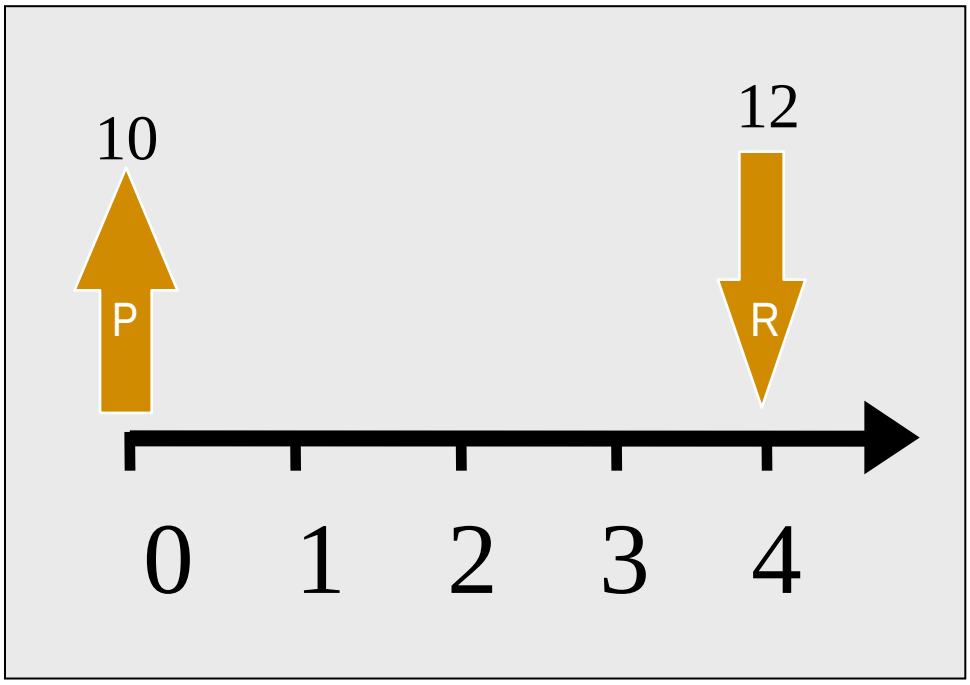
A dollar today or a dollar a year from now?

A dollar a year from now or one two years from now?

90 cents today or a dollar a year from now?

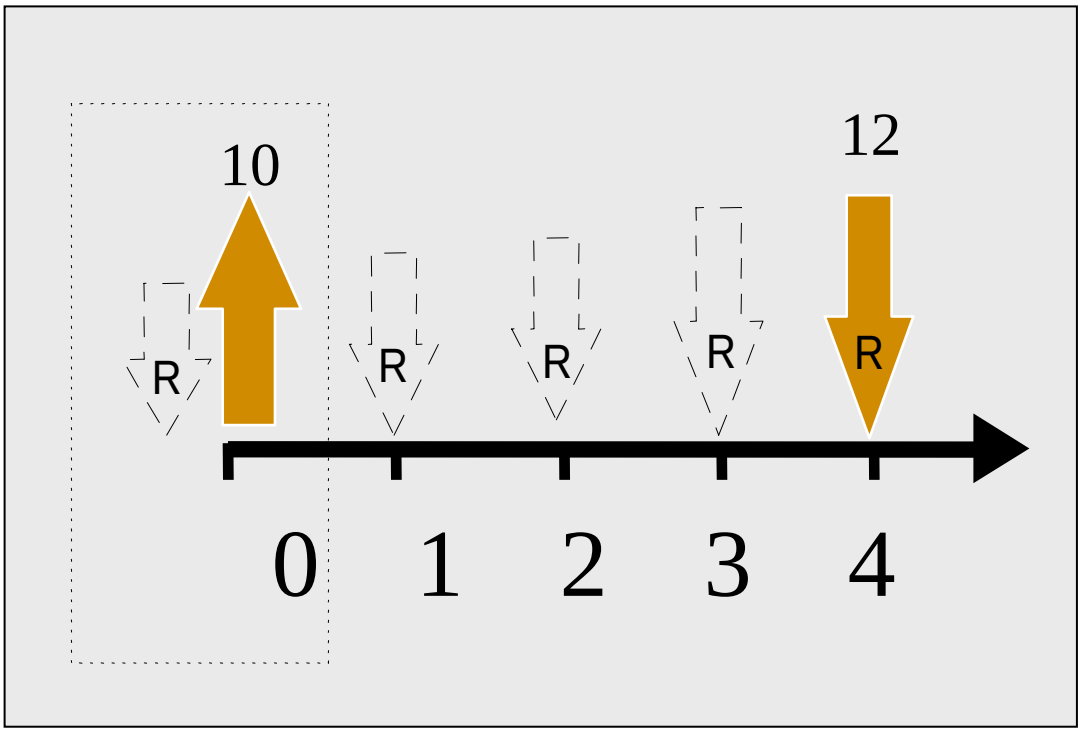
- Moving money forward in time is called *compounding* (using an interest rate).
- Moving money back in time is called *discounting.*
- Because moving money back in time -- to the present from the future -- is the most common of the two, financial people call this rate: *the discount rate.*

Exercise 5.3: So, Let's Make A Deal....



Discount Rate: 8%

Exercise 5.3 (continued)



Fortunately, doing the math yourself is not necessary. Use Present Value Table (top half) in Appendix A, page 1. For NPV formulas, see Appendix A, Page 2.

Net Present Value = Present Value of Future Cash Flows - Investment

The present value of a single $1 payment four years from now (at 8%) is .735 dollars.

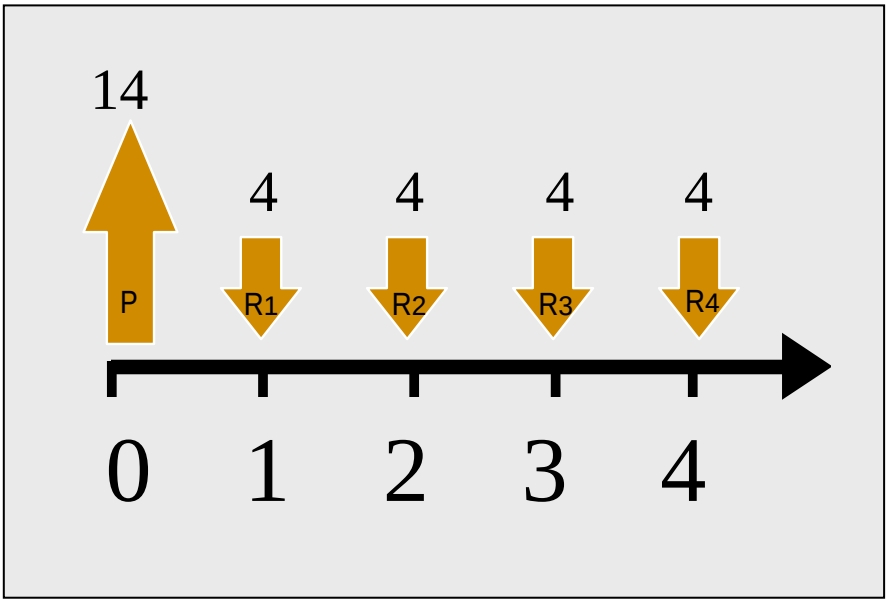
For this problem:

NPV = [12 x 0.735] - 10 = (1.18)

NPV Decision Rule: **If NPV is positive, recommend the project.**
If NPV is negative, reject the project.

So…reject this deal.

Exercise 5.4: So Let's Make Another Deal...



Discount Rate: 8%

This type of a cash inflow is called an *annuity,* a steady stream of equal annual cash inflows.

If the steady stream of cash inflows does not stop, but keeps occurring forever, the annuity is given a special name: *a perpetuity.*

For practice, use the top half of the PV table to calculate the present value of all four cash inflows:

PV of R_1:

PV of R_2:

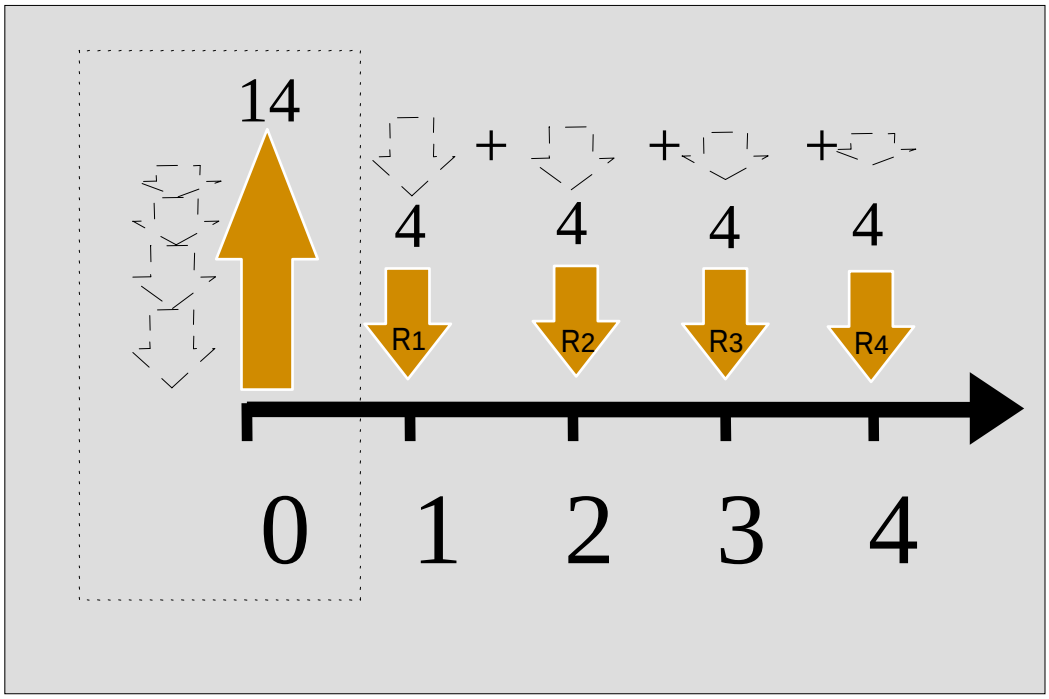
PV of R_3:

PV of R_4:

TOTAL PV of cash inflows:

Net present value = PV of future cash flows – Investment =

Exercise 5.4 (continued)



Fortunately again, doing the math yourself is not necessary. Use Present Value Table (bottom half).

Net Present Value = Present Value of Future Cash Flows - Investment

For this problem:
NPV = [4 x 3.312] - 14 = (0.75)

So...reject this deal, also.

Positive NPV projects create value for the shareholder. Negative present value projects destroy value for them.

NPV Problem 1:
The SCADA Upgrade

(Repeat of Payback Problem, page 5-11)

Fill in the Cash Flows from that problem:

At the end of:	Time 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows						
Cumulative Cash Flows						

(Do not use the cumulative cash flows.)

Assume the SCADA upgrade will last 10 years and the discount rate is 8%.

Draw the timeline diagram:

Calculate the present value of the savings for 10 years at 8%:

Calculate the NPV:

Remember: _____

_____

_____

Space for Practice Problems:

Common Pitfalls in Using NPV

Some common pitfalls in evaluating projects are:

1. Including interest expense of debt inappropriately
2. Neglecting taxes (PT/AT)
3. Mishandling depreciation (DTS)
4. Forgetting working capital (Inventory Cash Flow)
5. Inconsistent handling of salvage and its depreciation
6. Misusing Inflation
7. Using wrong discount rates
8. Using wrong or inconsistent evaluation periods
9. Forgetting to disregard sunk costs and to include opportunity costs
10. Forgetting real cash flows from inventory stock

The next several pages discuss these ten items.

The first five pitfalls can be avoided by referring to the "Cash-Adjusted Income Statement" format (Figure 6-6) and the rearranged version of the same information, known as the Cash-Flow Calculation Template (Figure 6-7). Figure 6-6 is the basis for explaining the theory. Figure 6-7 is a more practical tool to use. This format can be used to calculate the cash flows for any single year of the cash flows for most investments being evaluated.

The format of Figure 6-6 is in three columns, the "with and without" format. The first column is the income statement for the forecasted year "without" the proposed investment. The second column is the income statement "with" the proposed investment. The final column is the difference or what VARIES between the two. The adjustments to this format are now discussed.

1. Interest Expense on Debt

From the "N/A's" in Figure 6-6, note that interest is immediately removed from consideration from this income statement format. This is appropriate because debt is a component in the opportunity cost of capital, a.k.a. the WACC or the discount rate. If interest were included in this income statement calculation and if the discount rate included the debt component (as is usually does), the perspective of the debt holder would be given double the importance.

2. & 3. Income Taxes and Depreciation

The income statement appropriately handles net income on an after tax basis, not pre-tax. It also appropriately handles depreciation as a pre-tax expense that reduces the tax bill. Because taxes are cash, depreciation (a non-cash item itself) does have some effect on cash flow. The amount of cash saved by depreciation expense is "deprecation expense x the tax rate". Because the depreciation itself is a non-cash expense, the entire amount of depreciation for this period is added back into net income to adjust net income to "cash only".

4. Working Capital

For some projects being evaluated, additional cash is necessary to put the project into operation. This is in addition to any capital costs and usually is either cash necessary to "prime the till" (the cash register) or increased purchases for inventory (spare parts). Working capital is usually a cash outflow in the year of completion of the project, "time= 0".

The analyst must also make a judgment as to what happens to that cash or those spare parts at the end of the forecasted life of the project. Usually the working capital is recaptured as a cash inflow at the end of the project, dollar for dollar in nominal dollars. This approximates the effect of inflation and/or

obsolescence of the parts. For example, if $100 of working capital was used as an outflow at time=0, then $100 was used as an inflow at the end of the forecast period. This last $100 is worth in present value much less than the original $100 "put into the till". Other approaches to recapturing working capital are possible.

5. Salvage and Depreciation

At the end of the forecast period, equipment may have a positive salvage value. If this amount was assumed in the calculation of annual depreciation expense, 100% of the assumed salvage is a cash inflow in nominal dollars.

Alternatively, the depreciation calculation can assume no salvage value. Salvage can still be taken at the end of the forecast period, but the salvage value must be reduced by the tax rate.

6. Handling Inflation

In calculating the present value of cash flows, inflation can be handled in more than one way. The key is to use "apples and apples" between a particular set of cash flows and the discount rate used to calculate the present values.

Discount rates are either
- nominal (includes inflation) or
- real (excludes inflation).

Example: If a *nominal* discount rate is 10% and the inflation assumption is 3%, the *real* discount rate is, therefore, 7%.

Cash flows are one of three types:
- nominal (inflated),
- real (un-inflated), or
- contractual (a special type of nominal cash flow that is not escalated)

Nominal cash flows are in escalated dollars, escalated by the assumed annual inflation rate. Nominal cash flows must be discounted using nominal discount rates.

> Example of *nominal* cash flows: the cost of maintenance of $100,000 over five years, escalated by 3% each year.

Year 1	Year 2	Year 3	Year 4	Year 5
100,000	103,000	106,090	109,273	112,551

Use *nominal* discount rate.

Real cash flows are stated in some constant year dollars, most often the year of the initial investment.

Example of *real* cash flows: the cost of maintenance of $100,000 over five years, expressed in "Year 1 dollars".

Year 1	Year 2	Year 3	Year 4	Year 5
100,000	100,000	100,000	100,000	100,000

Use *real* discount rate.

Contractual cash flows are stated in nominal dollars, but are not escalated as a matter of agreement between two parties. There may or may not be a real contract stipulating the cash flows. Depreciation Tax Shields are contractual cash flows. Contractual cash flows may or may not be an annuity like in the following example.

Example of *contractual* cash flows: as a result of litigation, a vendor will pay to a (former) client $100,000 each year for five years.

Year 1	Year 2	Year 3	Year 4	Year 5
100,000	100,000	100,000	100,000	100,000

Use *nominal* discount rate.

One key point regarding handling inflation:

> Look for annuities from real cash flows and use the real discount rate, as opposed to escalating them to nominal cash flows, losing the annuity effect, and forcing several single payment calculations.

7. Discount Rates

In addition to keeping "apples and apples" between discount rates and cash flow types, each respective cash flow must be discounted with the appropriate discount rate in regards to the cost of the funds being used and the risk of the cash flows. This will be discussed in greater depth later in this module.

8. Evaluation Periods

When comparing two "mutually exclusive" projects (meaning you will do one, not the other), the evaluation periods need to be the same. You may need to "chain" a one or both projects to get equal periods.

9. Sunk Cost and Opportunity Cost

Sunk costs have no bearing on the future. They should be disregarded. Opportunity costs are lost cash-flow opportunities if the project is undertaken. These lost opportunities should be included as costs (negative opportunities) when valuating the project.

10. Inventory Carrying Charges

Many financial analyses deal with spare parts. Spares often have real cashflows associated with them that must be included. These could include items such as property taxes and perhaps insurance. The cost of capital is a real charge also, but is included in most problems in the discount rate, not as a cashflow.

The Cash-Adjusted Income Statement

Using the "With and Without" Principle

(This represents one year's cash flow. This template needs to be applied until all the years are known for the entire evaluation period of the investment.)

For Year 1:	*Without Project*	*With Project*	*What Varies*
Revenues	1200	1300	+100
(Var. Costs)	(350)	(250)	+100
Margin	850	1050	+200
(Depreciation)	(50)	(150)	(100)
(Other Fixed Costs)	(275)	(300)	(25)
EBIT	525	600	+75
(Interest)	(N/A)	(N/A)	(N/A)
(Taxes)	(210)	(240)	(30)
Net Income	315	360	+45
Other cash flows not included on the Income Statement		a) Depreciation Add Back	+100
		b) Change in Working Capital	(15)
		c) Salvage	-0-
		d) Capital Investments	-0-
		Total Cash Inflow (Outflow)	**+130**

Figure 6-6

The Cash-Flow Calculation Template

This template is the algebraic equivalent of the one on the previous page. It is more practical, but it doesn't show the tie to the income statement. The previous page was a "bridge" to this template.

Calculating Cash Flows for a Single Year

1) Increase in Revenues	**+100**
2) plus: Decrease in all types of operating expenses*	**+75**
3) equals: Increase in operating income before taxes	**+175**
4) times: [1-Tax Rate]	**x 60%**
5) equals: Increase in operating income after taxes	**+105**
6) plus: Depreciation Tax Shield [Depr. Expense X Tax Rate]	**+40**
7) minus: Increase in Working Capital	**(15)**
8) plus: Salvage - after Tax	**-0-**
9) minus: Capital Expenditures**	**-0-**
equals:	
Cash Inflows (Outflows)	**+130**

* Represents the total of all types of costs that are pre-tax, including such costs as decommissioning costs.

** Includes construction costs and purchases.

Figure 6-7

NPV Problem 2:
New pH Monitors

A set of pH monitors on the scrubbers at the Boyce Coal Plant has been a problem due to high maintenance, averaging $33,000 per year. This maintenance is by an outside vendor. Engineering has ordered a replacement set from a new vendor. The new monitors should have maintenance costs of only $8,000 per year. The cost of engineering time for this replacement is $15,000. An outside contactor will do the engineering. Assume the engineering, procurement, and installation are all done at "time zero". Also assume the above costs are in present-day dollars and will escalate with inflation.

The monitors themselves are $85,000. The installation will cost $55,000, also by an outside contractor. The cost of spare parts for the flow monitors is $20,000.

Assume a 12% nominal discount rate, and 3% inflation. Salvage value of the new meters is estimated to be $5000.

Part A: From a purely financial standpoint, was the initial purchase decision a good one?

Part B: The outage is ready to go. The vendor will take the monitors back for 50% of the original sale price. Should you continue to install the monitors or return them to the vendor?

For companies with income and property taxes: *Income tax rate is 40%. The old monitors are fully depreciated and there is no salvage value. Assume straight-line depreciation for the new monitors and a ten-year life. Disregard property taxes on the spares.*

NPV Problem 2:
New pH Monitors (cont.)

NPV Problem 2:
New pH Monitors (cont.)

Remember: _____

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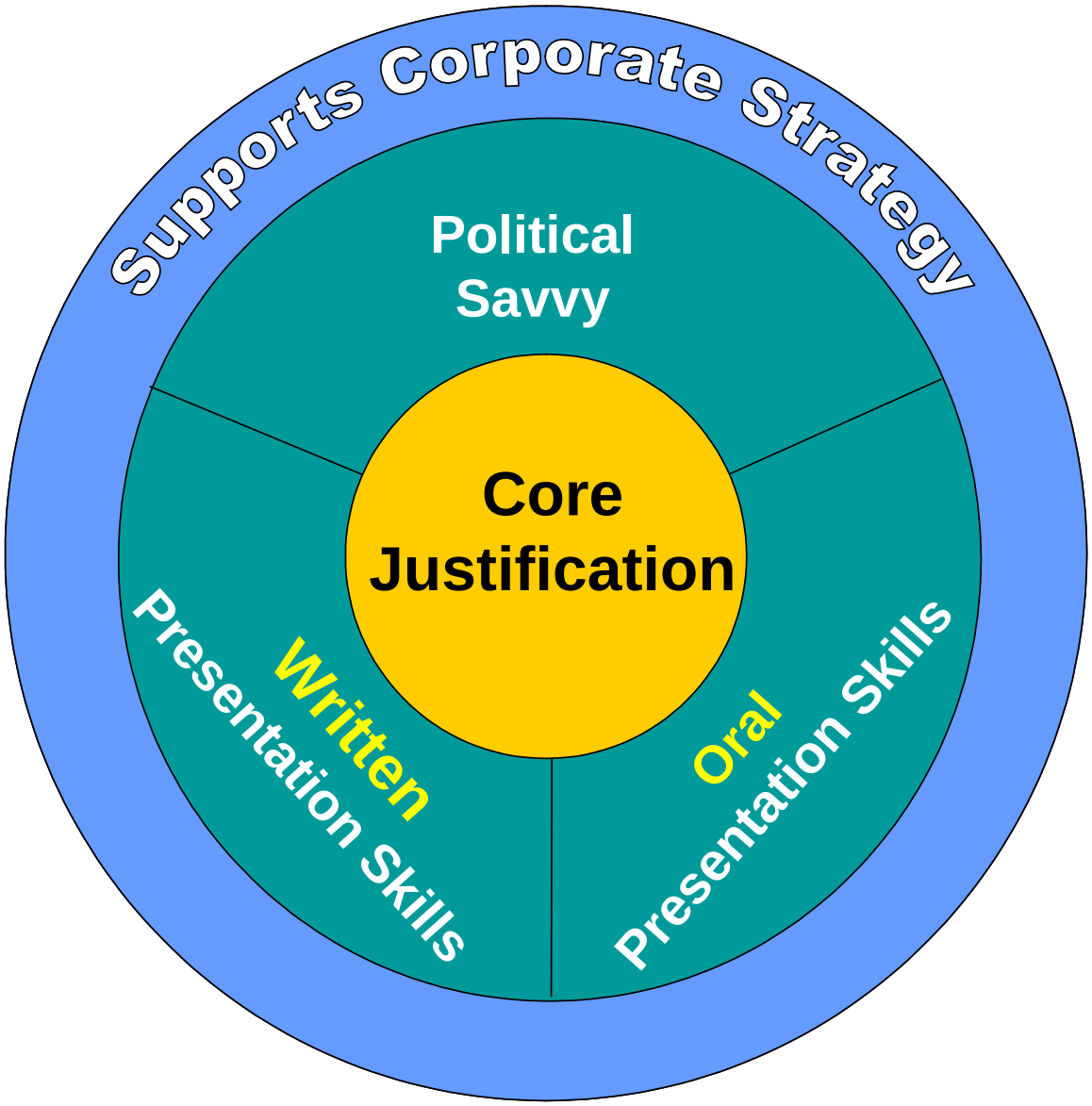
Developing Solid Business Cases

Keys to Getting Things Approved



Business Case

A document or presentation that justifies (and convinces others of the justification for) a business expenditure.

Typical elements may include:

I. Title
II. Statement of Problem
III. Description of Proposed Expenditure or Strategic Initiative
IV. Detailed Scope (what is the job?)
V. Summary of Cost Estimates (capital, O&M, inventory increases, etc.)
VI. Schedule and Timing Windows
VII. Scheduled Deliverables
VIII. Project Controls
IX. Justification (savings & other benefits)
    - Financial Savings (hard and soft)
    - Strategic Intangible Benefits (hard and soft)
X. Prerequisites
XI. People and Cultural Impacts
XII. Potential Problems and Risks with Contingency Plans
XIII. Project Priorities (prioritization of quality, time, cost)
XIV. Assigned Responsibilities
    - Sponsors
    - Leaders
    - Technical
    - Support
    - Designated cynic
XV. Recommendation(s)

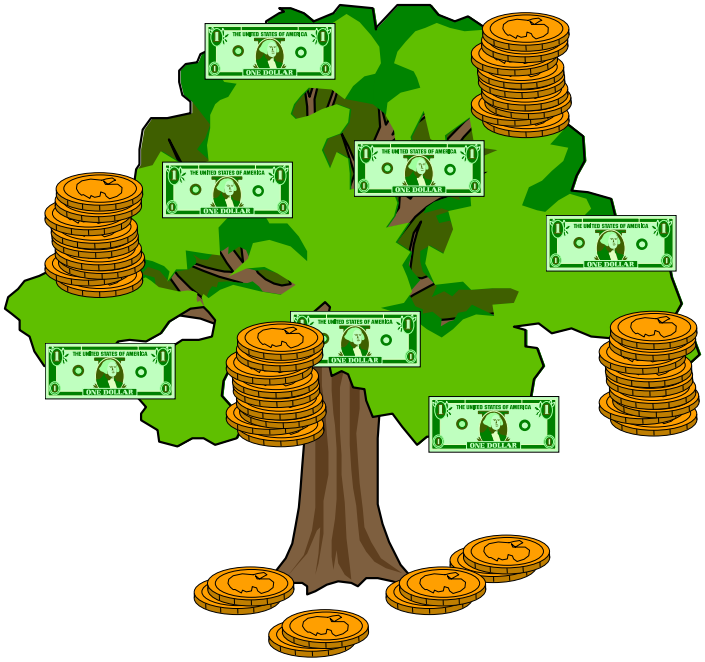
Capital Rationing

Rejecting some positive NPV projects due to perceived financial limitations, such as a debt reduction program, or limits on the number and sizes of projects that management can handle at a point in time.

- Too bad we have it
- It isn't always necessary
- Most companies don't have a good way to do it

Some arguments for capital rationing include:

- the ratio of equity to debt impacts the appropriate discount rate, thus affecting the firm's ability to acquire other investments, such as a strategic purchase of another company
- in the real world, it is a good way to force hard decisions
- in the real world, there is a limit to how many projects a management team can implement



Profitability Index (PI) and Project Ranking (Under Capital Rationing)

Without capital rationing, project ranking is unnecessary. The company should pick all projects that have a positive NPV. These are the projects that increase shareholder value. However, with capital rationing, NPV does not always provide the best ranking of projects. PI often can give a better picture of which projects to be selected under capital rationing. PI allows you to pick the combination of projects that satisfies the capital constraint and yields the biggest aggregate NPV.

Exercise 5.5: Capital Rationing by PI vs. NPV

The Substation Design Department for GOA Power and Light has identified six possible capital improvements. The corporate office allows you to spend only $2.5 million next year for this program. Which projects should be done?

Here are the six projects and their NPV and PI:

Project	Initial Investment	NPV	PI
A	$ 250,000	$ 50,000	1.20
B	250,000	35,000	1.14
C	1,000,000	150,000	1.15
D	1,500,000	240,000	1.16
E	500,000	85,000	1.17
F	250,000	62,500	1.25

Assume the capital budget can not exceed $2.5 million.

a) Use NPV to rank and select the best projects for the shareholder.
b) Use PI to do the same thing.

Exercise 5.5 (continued)

Ranking by NPV

Project	Initial Investment	NPV
D	$1,500,000	$240,000
C	1,000,000	150,000
E	500,000	85,000
F	250,000	62,500
A	250,000	50,000
B	250,000	35,000

Ranking by PI

Project	Initial Investment	NPV	PI
F	$ 250,000	$ 62,500	1.25
A	250,000	50,000	1.20
E	500,000	85,000	1.17
D	1,500,000	240,000	1.16
C	1,000,000	150,000	1.15
B	250,000	35,000	1.14

a) NPV would select projects D & C with combined NPV of $390,000.

b) PI ranking would select projects F, A, E, & D with combined NPV of $437,500. The PI set has a better total NPV overall.

However, this is only good for project sets that do NOT cross beyond a single year. For project sets which cross multiple years, like most electric-utility situations, advanced mathematical models (linear and integer programming) are needed to arrange projects in such an order to maximize shareholder value.[2]

The Basic Equation for Profitability Index:

$$PI = \frac{PVsavings}{Investment}$$

A useful algebraic equivalent:

$$PI = \frac{NPV + Investment}{Investment}$$

More NPV Practice Problems

NPV Problem 3:
Two Competing Options

The Hauling Department of EG-Biz, Inc. has done an economic study justifying the purchase of a new vehicle to carry small loads around their largest construction yard. A small pickup is one option. A "souped up" golf cart -- which could carry a smaller load -- is another. The Hauling Department is willing to reduce the OT budget if one of the two options is approved.

The cost of the used small pickup is $12,000. The golf cart is $2,500. The first-year annual savings from reduced OT for the small pickup is $2300. The first-year savings for the golf cart is only $1500 because of the smaller carrying capacity.

For simplification of this problem, you may neglect the effects of taxes and depreciation. The life of the pickup is ten years. The life of the golf cart is five years.

The *nominal* cost of capital for EG-Biz, Inc. is 8% which includes a 3% inflation component. Therefore, the *real* cost of capital is 5%. Inflation must either be included in the cash flows or not included in the discount rate. You can either escalate the cash flows by 3% each year or simply use 5% as the discount rate on a unescalated annuity.

Based on NPV analysis, which option is the best financial decision?

Space for More NPV Problems

NPV Problem 4:
The Price of a Stock & the Value of a Company

a) You are considering buying some stock in AppleSoft Inc. (AI). The after-tax dividends for AI's stock is forecasted to be $2.00 for the next three years, $2.50 for the next three years, and $3.00 forever after. You feel the risk adjusted discount rate for this company is 15%. What are you willing to pay per share for AI's stock?

b) AI has 1,000,000 shares outstanding. You are a merger and acquisition advisor to another company who is considering buying all of AI. What would you recommend to your client as their "walk-out" price for AI?

What additional considerations should you have in your analysis?

Like...this is the BIG thing to remember:

Remember: _____

_____

_____

The setup for this problem is over simplified. The actual values that are used in valuating a company are all free cash flows to owners (shareholders), not just the dividends. That includes cash flows that are kept in the business. Remember, in theory, retained earnings are additional shareholder claims on the assets of the company. It is their "money" just like dividends. They – as agreed by their representatives, the board of directors – have decided to "invest" their return back into the company, rather than taking the funds now and investing in some other instrument.

These cash earnings are forecasted over some lengthy period, say five years. The analyst must also estimate the "terminal" value for the company's cash flows. A terminal value is one single cash flow as a surrogate for value beyond the forecast period. This is much more difficult for the analyst than the actual five-year cash forecast itself. The art in valuing a company is in estimating this terminal value. This terminal value has several names in business literature, *Growth Options, Management Equity, Hidden Value Index, etc.* Often, growth options represent more than 50% of the market value of a stock.[4]

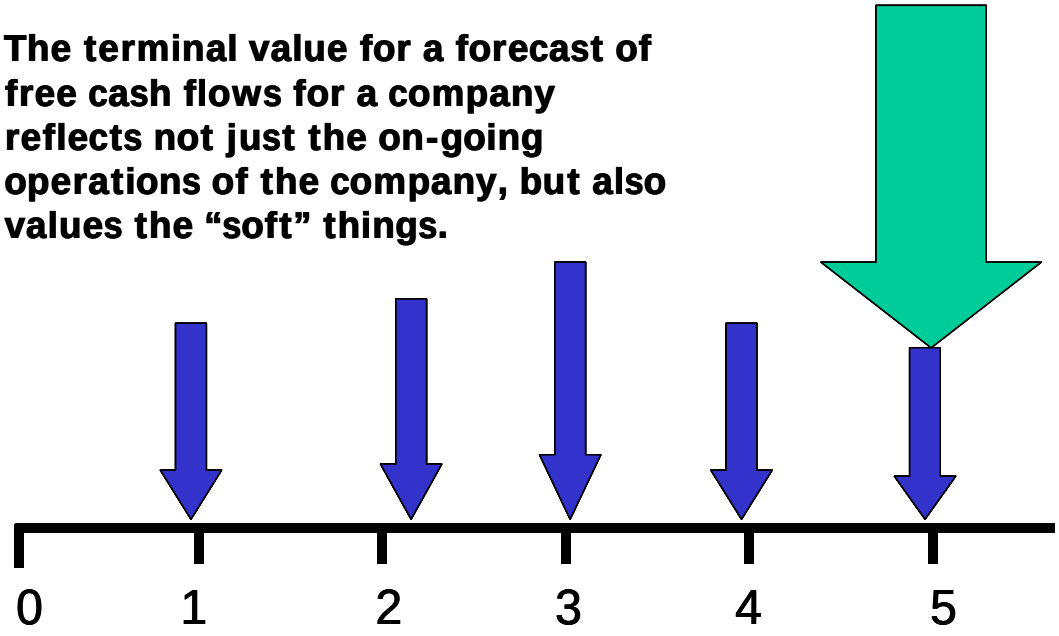
Valuation of an asset is done in the same way. A power plant, for example, can be valued in the market place by estimating it's cash earnings over time and discounting those cash earnings back to the present using an appropriate discount factor. This market value for a power plant may differ widely from the book value of the plant on the accounting records of the company. A terminal value beyond the forecast period is also necessary.

The selection of an appropriate discount factor is discussed later in this module.

The Big Green Arrow!

(a.k.a. management equity, hidden value, or growth options.)

The terminal value for a forecast of free cash flows for a company reflects not just the on-going operations of the company, but also values the "soft" things.



Handling Uncertainty In Decisions

Module 6

Overview

Uncertainty

In making decisions, the state of having more than one possible outcome. In uncertain situations, the probability of each outcome can only be estimated.

Risk

In making decisions, the probability of outcomes -- when the probability is certain, like in a coin flip.

General Approach to Handling Uncertainty

- Take an educated guess at the probabilities of all reasonable outcomes.
- Draw a decision tree using those probabilities.
- Make a preliminary decision based on the decision tree. Revise the probabilities until the decision tree yields a "jump ball" (called the "cross-over" probabilities.)
- Use intuition regarding your feelings about the "cross-over" probabilities. See if this intuition revises the preliminary decision.

Examples

- a vendor promises certain benefits from purchasing their equipment
- weather affects your decision
- your competitor may shut down one of their generating units
- potential health problems affects your retirement decisions
- your business could take off (or might not)
- regulatory policy may be affected by a change of political leadership
- a project may or may not be approved
- adding more pipefitters will keep a work package off an outage's critical path
- a feedwater heater may corrode to the point of hurting heat-rate

Uncertainty Problem 1:
The NASA Decision

The following is a fictitious case study:

The space shuttle, Discovery, is near the end of a long mission. You are the head of the mission. There is growing pressure from Congress to cut the NASA budget. You need to do everything you can to minimize any additional costs for this mission. You may be requested to testify at Congressional hearings on the prudence of your decisions.

You had planned to have the shuttle land today at Kennedy Space Center in Florida. However, weather prohibits landing there today. You have two additional days of fuel and all other necessary supplies. A fuel cell has failed on the shuttle. If another one fails, the astronauts will have some increase in safety risk due to the lack of on-board power to some instruments. The other fuel cells are working within specifications with no problems.

You have a decision. You can land at Edwards Air Force Base in California today or wait until tomorrow to see if the weather clears in Florida. Your meteorologists predict a 55% chance of clearing tomorrow and a 95% chance for the next day.

Assumptions:

- Transportation of shuttle from Edwards to Kennedy: $5 million
- Cost of additional days in space: $3 million per day
- No weather problems for next three days at Edwards

Do you order the shuttle to land at Edwards today or wait for tomorrow?

Uncertainty Problem 1: NASA Decision Tree (continued)

Learnings: _____

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Uncertainty Problem 2: The Cooling Tower Failure

As plant manager of Desert Vista Nuclear Plant (2 units @ 1200 Mw each), you have been awakened at home late one night (2300). Unit 2 has just had a cooling tower electrical failure. Each unit has three mechanical-draft cooling towers. Each tower has six large fans. One electrical circuit feeds three of the fans and a second circuit feeds the other three.

At 2200 that evening, one circuit on cooling tower 2A failed due to corrosion that has been observed developing for some months. The loss of three fans derated the unit by $1/6^{th}$ or 200 Mw.

Unit 2 is headed into a refueling outage at 2359 on Thursday, essentially three days from now.

Two options are available. First, the unit could be run until the outage with a 200 Mw derate.

Second, the complete tower could be removed from service, making the derate 400 Mw. The failure is in a wet location and cannot be fixed unless the entire tower is down. The length of the outage is uncertain. At this point, there are three possibilities: an 8-hour, a 16-hour, and a 24-hour outage. Your maintenance supervisor suggests the best guess is 16 hours, but the other extremes are also quite possible, with a "little leaning" toward the 24-hour estimate. Based on this assessment, you estimate the probabilities at 0.2, 0.5, and 0.3 respectively.

The average cost of lost generation (differential) is assumed to be $30 per Mwh if the unit is derated by only 200 Mw. If the unit is derated 400 MW, the cost is expected to be $1 more because of the low load in the region and because many other large base load plants are in refueling or overhauls.

Once a technical advisor from the vendor is able to assess the situation, your maintenance supervisor thinks she will know more precisely about the length of the outage IF you decide to stay on line for the time being. She should have the more certain estimate by noon tomorrow. Because of contractual obligations to the power exchange, if you decide to stay on line for now, you will not be able to come off line until midnight tomorrow if the firm estimate of the length of the outage if favorable.

As midnight approaches, you need to make an operating decision. Do you fix immediately or not? You wipe the sleep from your eyes and try to remember that "tree stuff" that helps you make decisions in uncertain situations.

Uncertainty Problem 2: The Cooling Tower Failure (continued)

Learnings: _____

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Uncertainty Problem 3: The New Service Center (Part E)

[See Module 6]

Original Information: A new service center has the following costs. $250,000 for construction and $50,000 in opportunity cost for the land. The architectural design is complete. The forecasted logistical savings from "Smartt and Wise – the Numbers Guys" is $45,000 (year 1), $90,000 (year 2), and $135,000 (year 3 and beyond). The NPV for this set of assumptions is $410,000.

New Information: Smartt and Wise are great IE's, but D-Biz, Inc. is concerned about the economic forecast embedded in their numbers. D-Biz has done a four-scenario analysis of the "build-out" potential for the new part of town. Factoring that information into the logistical savings forecast yields the following four cash flows:

	Probability	1	2	3	4	5 & Beyond
High	20%	55	120	135	135	135
Base	50%	45	90	135	135	135
Low	20%	20	40	90	110	135
Very Low	10%	20	20	20	20	20

1) Based purely on the financial data, using NPV, what do you recommend?
2) What are the cross-over probabilities?

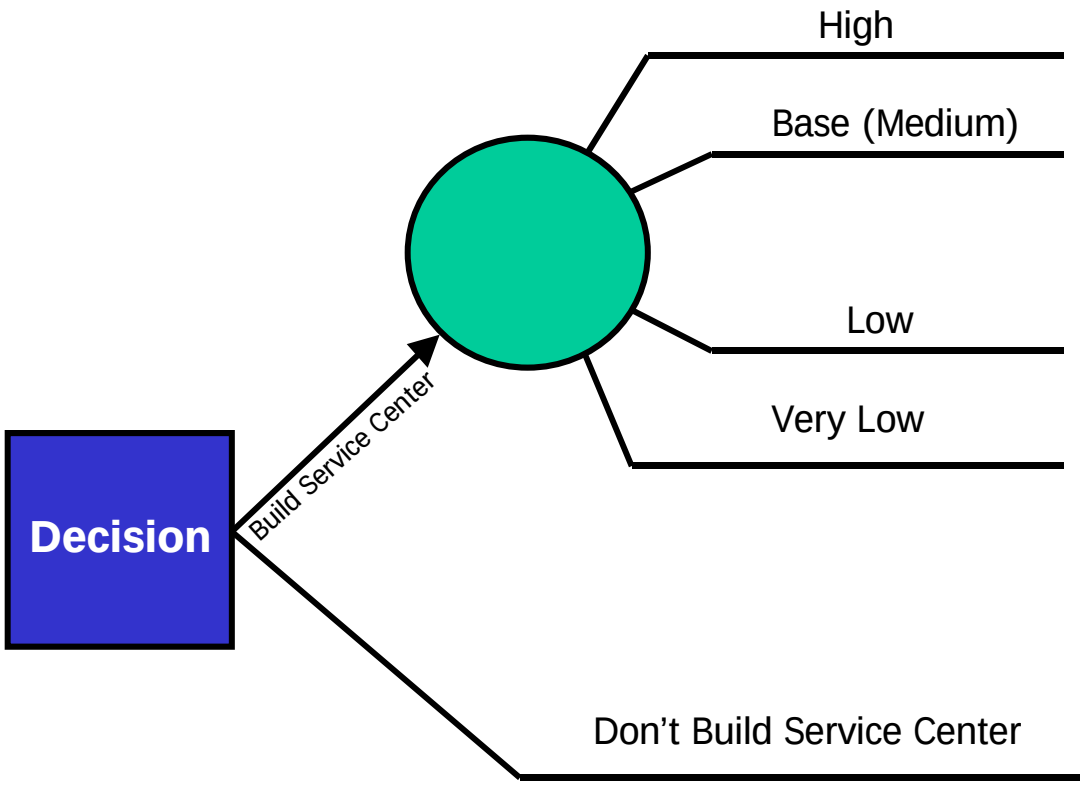
The NPV of the Base case is $410,000.
The NPV of the High case is $444,000.
The NPV of the Low case is $296,000.
The NPV of the Very Low case is ($177,000).

Learnings: _____

_____

_____

Uncertainty Problem 3: Decision Tree for Service Center:



Uncertainty Problem 4: The Settlement Offer

A legal battle is looming regarding a messy wrongful discharge case at GOA, Inc. A employee was terminated and is suing. Both sides are firmly entrenched in their position and the case seems headed for court. Finally one party "blinks", the employee's attorney offers a $100,000 settlement proposal. As employee relations manager, you are asked to give your recommendation to the VP of HR.

Your attorney and you discuss possible outcomes if you reject the offer. These are presented below. IF you reject the offer, the case may go to court (70% chance) or, perhaps, be settled later (30% chance).

Outcome if Case Goes to Court	Amount paid to employee	Probability of Outcome
Lose Big	200	.2
Lose moderate	75	.3
Lose modest	25	.1
Win	0	.4

Other Outcomes if Offer Rejected	Amount paid to employee	Probability of Outcome
Settle later for more money	150	.2
Settle later for same offer	100	.3
Settle later for less money	50	.3
Employee Drops Case	0	.2

You and your attorney agree a $50,000 counter offer is another possible avenue to take. Your attorney advises there is about a 40% chance of it being accepted. So far, you have spent $25,000 on the case in attorney's fees and expect the remaining court litigation will cost another $50,000. If you win, you will receive no repayment of your fees under the conditions of this case. You will not have to pay the employee's attorney's fees.

What do you recommend to the VP?

Uncertainty Problem 4: The Settlement Offer (continued)

Learnings: _____

_____

_____

Uncertainty Problem 5: To Buy an Option or Not Buy an Option

An Independent Power Producer (IPP) has completed an NPV using conceptual data for the cost estimate and twenty-year profitability forecast for a proposed combined cycle power plant. This conceptual NPV is reasonably positive.

The IPP can do the preliminary engineering (preliminary design, permitting, placing of major equipment orders, site studies, and improved project financial justification) of the project for $5million. It will take one year.

After preliminary engineering, there are two major sources of uncertainty.

First, preliminary engineering will sharpen the cost estimate and the twenty-year profitability forecast. The NPV of the new estimate and forecast could remain the same as the conceptual NPV. It could be more. It could be less.

Second, in one year, there will be a national presidential election. The tax laws may change depending on the presidential administration. The corporate income tax and capital gains tax could remain the same. It could go up. I could go down. This will affect the NPV accordingly.

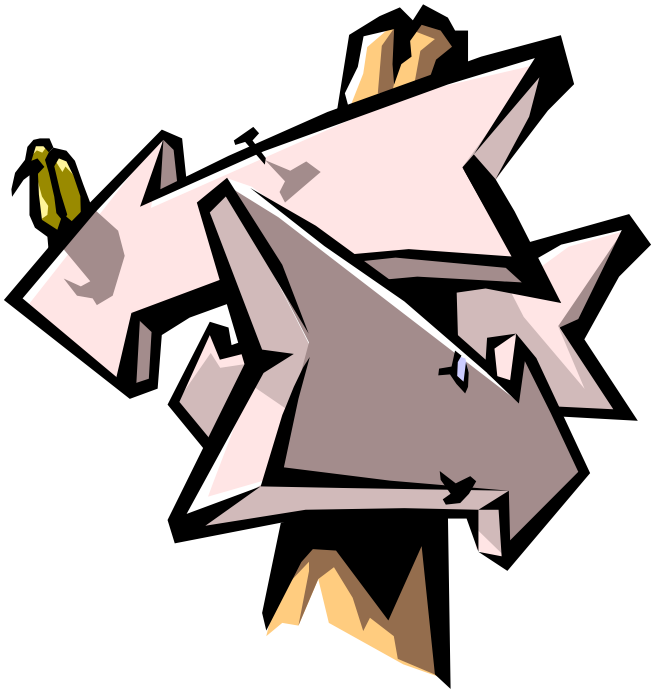
In the space below, draw the structure of the decision tree.

Line #	Price of Electricity	Availability	Cost of Condenser Upgrade ($millions)	NPV ($000)
1	64	70%	30	From Part A
2	64	70%	40	$ 4,158
3	64	60%	30	$ 2,046
4	64	60%	40	$ (4,007)
5	64	50%	30	$ (6,119)
6	64	50%	40	$ (12,173)
7	54	70%	30	$ (1,453)
8	54	70%	40	$ (7,507)
9	54	60%	30	$ (7,952)
10	54	60%	40	$ (14,006)
11	54	50%	30	$ (14,451)
12	54	50%	40	$ (20,505)
13	74	70%	30	$ 21,876
14	74	70%	40	$ 15,823
15	74	60%	30	$ 12,045
16	74	60%	40	$ 5,991
17	74	50%	30	$ 2,213
18	74	50%	40	$ (3,841)

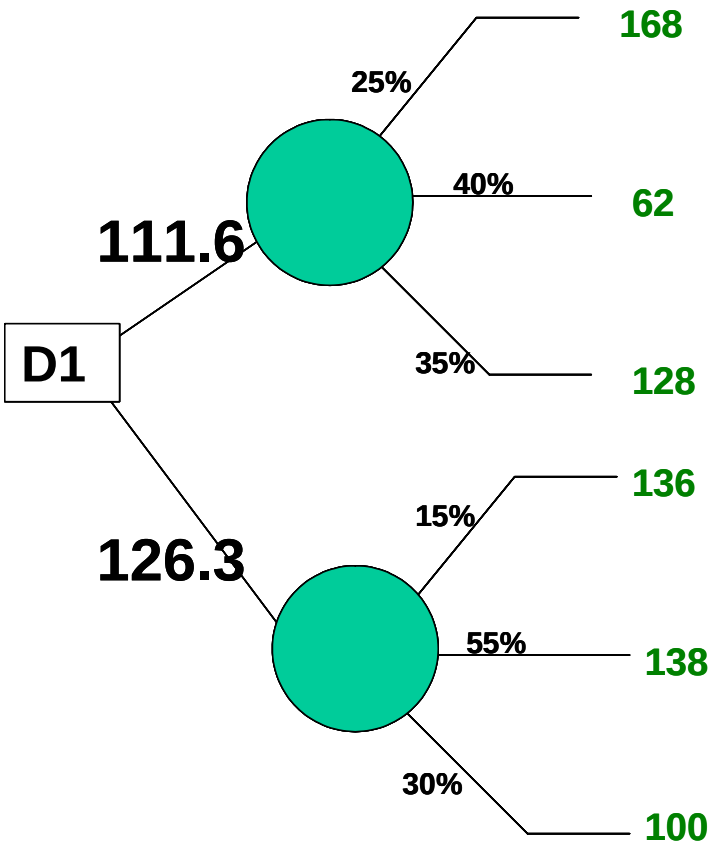
Quantifying Intangibles

When intangibles play a major role in a decision, decision makers will need to provide an assessment of the impact of intangibles on the over all decision. The Fundamental Philosophy for Decision Making says to separate cash considerations from intangibles. Therefore, after a decision tree has been constructed and analyzed using cash flow considerations, the same decision tree structure can be used to assess the intangibles. Here is an overview of steps:

1. List all major intangibles. (This might best be done even before doing the cash part of the decision tree.)
2. Weight each major intangible according to "importance to the decision" using the "Ten Point 'Must'" System.
3. Compare each terminal outcome of the decision tree against the list of intangibles, again, using a 'Ten Point 'Must'" System.
4. For each terminal outcome, calculate the overall intangible score. See example.
5. Using the decision tree, calculate the total intangible score for each D1 option. This may lead to more discussion of all the values and could require a recalculation of the tree.
6. Using common sense, weigh this intangible score against the cash-based decision tree. Make a final decision.



Scoring Intangibles



PR = 4	EPA = 8	Safety = 10
4 / 16	9 / 72	8 / 80
1 / 4	6 / 48	1 / 10
3 / 12	2 / 16	10 / 100
9 / 36	10 / 80	2 / 20
2 / 8	10 / 80	5 / 50
10 / 40	5 / 40	2 / 20

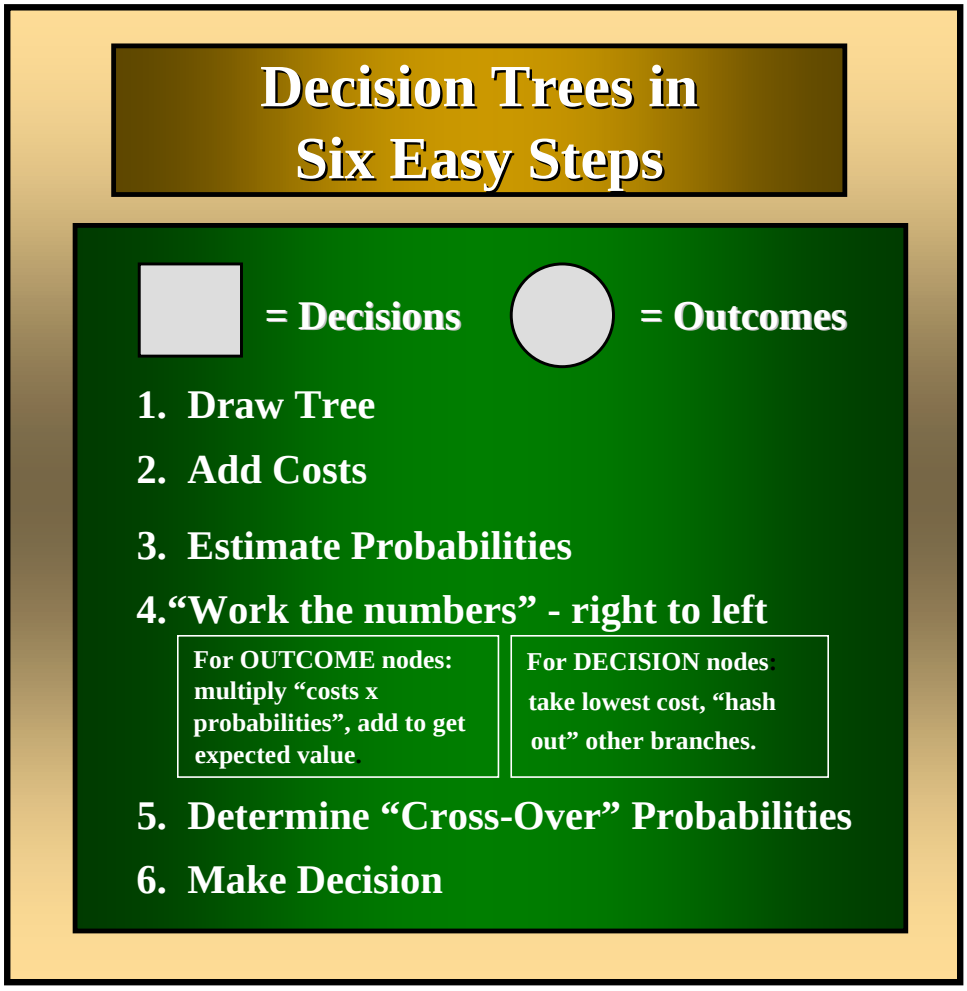
The Ten-Point “Must” System is from boxing. It has been applied four times in the above example, once for weighting the importance of each of the three intangibles and once each for the relative scores for each intangible. In every case, the group must agree on the “most” and give it 10 points. All other parts are weighted against that maximum score of 10. In “EPA” column above, two outcomes each have a 10. In theory, but rarely in practice, all outcomes could be 10’s.

More Applications for Decision Trees

What are the sources of uncertainty for these four examples?

1. You are 55 and can retire now or at 65.
2. Taking or not taking the spousal option with your pension
3. A possible settlement of a legal case
4. A purchase decision with uncertain benefits

Six Easy Steps...



Those who are interested in additional information should contact the Decision Analysis Society at the Fuqua School of Business at Duke University. (Use the internet.)

The Power of Decision Trees

The first benefit new practitioners of decision trees think of is:

Improved analytical analysis of a problem under uncertain conditions.

* It's better to be "vaguely right...than precisely wrong!"
* You can also use to consider intangibles (use a weighting system for the importance of each intangible)

BUT MOST IMPORTANTLY...

Decision Trees are a powerful group-facilitation tool

A Powerful Group-Facilitation Tool

But to the uninitiated, you are…

Be careful that your audience is familiar with the methodology.

Blastoff

Module

Case

Rules of the Contest

The instructor will organize the class into teams.

This case study has a Part A and a Part B. In Part A, teams will calculate the NPV of the problem. In Part B, teams will construct a decision tree, calculate the expected value, and recommend a decision for top management.

You will need the correct answer for Part A to complete Part B. However, a team member(s) can begin working Part B before the remainder of the team finishes Part A.

Each team will read the text of the case and work the case using the forms provided. The instructor will only give general helps appropriate and useful to all teams. The first team to complete the case with the exact correct answer will receive an award.

If no team finds the correct answer in the time available, the instructor will decide on which team got the closest. It is possible that no team will receive an award.

Blastoff Part A

Background

It is the year 2015. The Good Old Amalgamated Power Company (GOA) recently announced the shut down and mothballing of Thomas N. Toobleek Power Station, Units 1, 2 & 3, the three oldest units of four coal units at the vintage power plant. Mr. Toobleek was a former CEO of GOA.

Affected employees have been relocated to equivalent jobs in GOA's other plants. Ten transferring employees have worked closely together for over a decade and are disappointed to be separating. They represent a diverse set of skills covering all maintenance crafts and operations. All of them are baby boomers who probably want to work another five to seven years. They wish they could stay together. They are socially close also. For example, as part of the local

bowling league, they began calling themselves many years ago the "Toobleek Ten".

Before getting the word on his pending transfer, one of the Toobleek Ten was surfing the internet contemplating his future. He read about a US Dept. of Energy (DOE) study that has determined a new type of generation plant is feasible using rocket-engine technology. DOE is looking for a site to build a full-scale demonstration project. The demonstration is planned to last five years, after a three-year construction and startup phase.

The rocket engine technology has been developed by ZIP Technologies, Inc. "ZIP" refers to the fact that this type of generation has NO EMISSIONS...none, nada, zip! DOE is interested in demonstrating the ZIP technology in economically realistic sizes (50-150 MW). To date, the only demonstration has been a 300KW test facility. Unit 1 at Toobleek is 100 MW and, being situated on one end of the plant, is ideal for the demonstration project.

After the next bowling league night, the *Toobleek Ten* discuss how much fun it would be to end their careers by working on such an innovation. One creative member dubs the project "Blastoff". The name sticks among the ten. They decide to recommend *Blastoff* to management.

The new plant director of Toobleek, Donald Bladeson, was impressed with their presentation. With his help, upper management has assigned Nancy Nonaught, a junior financial analyst, to work with the *Toobleek Ten* to see if the demonstration project makes financial sense for GOA's shareholders. She knows little of power generation and must rely on the expertise of the *Toobleek Ten* to complete the analysis of *Blastoff*.

Technical Information[1]

The proposed project consists of the DOE, in partnership, with the developers of ZIP, providing a "Gas Generator" and related air separator and fuel cleaning plants.

The gas generator burns oxygen (not air) with clean fuels (natural gas, gasified coal, etc.) and produces both steam and carbon dioxide. The steam is sent to a steam turbine-generator. After condensing, the water is returned to the gas

[1] For more detailed information on this new technology, see http://www.cleanenergysystems.com/2005/market.html. This case study has been simplified for the class room.

generator. The carbon dioxide is sequestered and sold as a by-product for mining. DOE will pay for all construction costs.

Assume the power from this demonstration provides new revenue. The region is under supplied.

DOE wants an existing electric utility to provide the site with a turbine/generator and condenser from an existing mothballed plant. The utility will also provide the labor for operations and maintenance. The utility will be free to sell the electricity and the carbon dioxide on the open market.

The utility must also buy the raw coal for the coal gasifying process.

The utility will provide fifteen talented people with field and operations experience to assist in the design, startup and operating phases (eight years).

The utility will need to upgrade the condenser and other equipment at a cost of $30 million, spread evenly over three years. That total amount will be depreciated over the life of the demonstration project.

To induce a utility to participate, DOE will provide a tax-free, cash payment to the utility of $15 million, spread evenly over three years after the contract is signed.

The operations of the demonstration plant requires a special license and will not be extended after the five year period. The key components of the rocket engine will be dismantled by the DOE.

Technical/Financial Assumptions

After some research, the Toobleek Ten come up with the following assumptions:

Forward Prices for:

- Electricity: $64/MWh
- Carbon Dioxide: $10/ton
- Coal: $1.5/mmBTU
- Labor: The labor provided by the utility will average $90,000 per person (including OT) per year PLUS an 80% payroll load.

Heat Rate: 10,000 BTU/KWh
Hours per year: 8760
Discount Rate: 8%
Tax Rate: 40%
Depreciation for Five Years: Straight-line
Inflation: None for the eight years

Size of unit: 100 MW
Availability Factor: 70%
Carbon Dioxide production: 50,000 Tons per year (after availability factor considered)
Non labor O&M: $18 million per year (pretax)

Blastoff Part A - Assignment

Your team is about to do what Nancy Nonaught is assigned to do...the NPV calculation. Using the three cash flow diagrams provided (INFLOWS, OUTFLOWS, NET) to calculate the net cash flows and determine the

NPV of *Blastoff*.

Some Things to Discuss First:

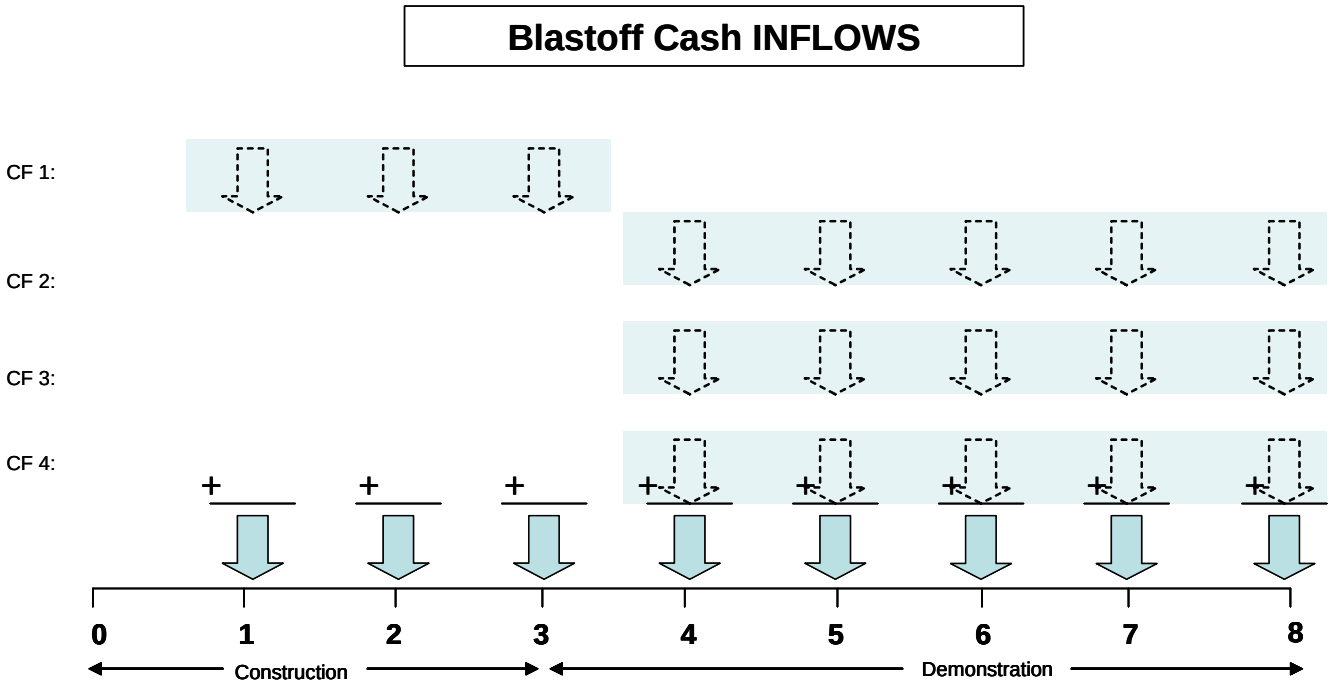
How long is this cash flow diagram? Eight years... but why?

What are the sources of cash INFLOWS (down arrows)? One is the deprecation tax shield for the $ 30 million on the condenser upgrade. There are three others for a total of four. What are they? When do they occur? Write their titles on the INFLOW diagram.

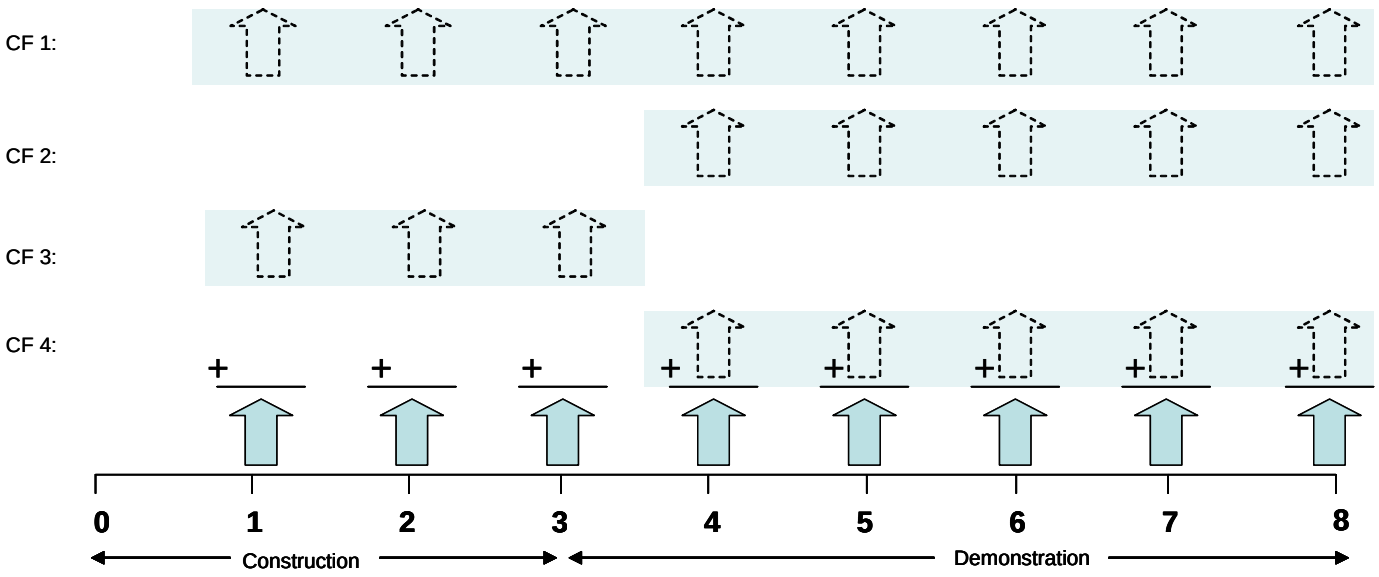
What are the sources of cash OUTFLOWS (up arrows)? There are four. What are they? When do they occur? Write their titles on the OUTFLOW diagram.

Which of the INFLOWS and the OUTFLOWS are reduced by the tax rate? Hint: The condenser upgrade, the DOE Inducement, and the Depreciation Tax Shield are not reduced by the tax rate. All other cash flows are. Put an asterisk (*) on the cash flows to remind the team to reduce the pretax number by (1-tax rate).

Cash Flow Diagrams



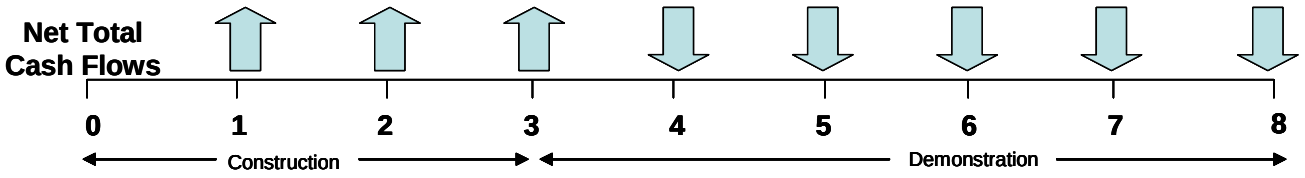
Blastoff Cash OUTFLOWS



Hint: Present value the following diagram. Do not present value each cash flow from the Inflows or Outflows Diagrams.

Blastoff Net Cash Flows

[Subtract Outflows from Inflows]



NPV of Net Cash Flows: _____

[round to nearest $000]

Some Helps with the Math on Five Cash Flows

Annual Revenue from Electricity:

Calculate how many MWh will be generated:

	x		x		=	
MW		hours/yr		Availability		MWh

Calculate annual revenue:

	x		=	
MWh		Price/MWh		Revenue [pretax]

Annual Revenue from Carbon Dioxide:

Calculate annual revenue:

	x		=	
Tons/yr		Price/ton		Revenue [pretax]

Annual Cost of Labor:

Calculate Salary per person with payroll load:

	x		=	
Direct Salary per person		(1+payroll load)		Cost of labor per person

Calculate annual loaded salary:

	x		=	
Cost per person		# of staff		Annual Labor Cost [Pre tax]

Annual Cost of Fuel:

Calculate annual cost per MWh:

[ ] x [ ] / 1000 = [ ]

$/mmBTU | Heat Rate | $/MWh

Calculate fuel cost per MWh:

[ ] x [ ] = [ ]

$/MWh | MWh (See Rev from Elect) | Cost of Fuel ($) [Pre tax]

Depreciation Tax Shield Of Condenser Upgrade:

Calculate annual DTS:

([ ] / [ ]) x [ ] = [ ]

Capital Cost | Years to Depreciate | Tax Rate | Annual DTS

Blastoff Part B

Background

The Toobleek Ten begin discussing their recommendation. It looks solid from a NPV standpoint, but they begin to realize there are some uncertainties in their proposal.

First, the price of electricity is suspect. $64 per MWh is the planning assumption for the company, but the price of electricity is highly volatile. The discovery of improved extraction techniques may send the price of natural gas down for the long haul. This will incent more combined cycle plants being built in the region which would depress the price of electricity. In addition, political trends may drive the price upward.

Second, the assumed availability of 70% may be optimistic.

Third, the cost to upgrade the condenser may be much higher. The track record of major capital projects is not good at GOA.

Because of these three sources of uncertainty, the Toobleek Ten discuss and reach consensus around the following probability tables.

Forward Price of Electricity ($/MWh)	Probability
$64	50%
$54	30%
$74	20%

Availability	Probability
70%	60%
60%	30%
50%	10%

Cost of Condenser Upgrade	Probability
$30million	80%
$40million	20%

Blastoff Part B - Assignment

Step One: On the following page, draw the structure of the tree and add the probabilities. Get it OKed by the *Biz Bucks Guy* who will give you a table of NPVs for the terminal paths.

Hint: Sketch your first attempt on this page, then, do the "official" one on the following page. A little practice helps. Use the full page. There are many numbers to add to the structure of the tree.

Step Two: Using the table of NPVs, calculate the expected value of the decision tree. The first team with the correct expected value wins.

Blastoff Decision Tree

D1

Appendix

A

Present Value Tables

These two tables are based on equations on the next page.

Lump Sum Table

The present value of a $1 (a single payment)

periods	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%
1	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.797	0.769	0.756	0.743	0.718	0.694
3	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.712	0.675	0.658	0.641	0.609	0.579
4	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.636	0.592	0.572	0.552	0.516	0.482
5	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.567	0.519	0.497	0.476	0.437	0.402
6	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.507	0.456	0.432	0.410	0.370	0.335
7	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.452	0.400	0.376	0.354	0.314	0.279
8	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.404	0.351	0.327	0.305	0.266	0.233
9	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.361	0.308	0.284	0.263	0.225	0.194
10	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.322	0.270	0.247	0.227	0.191	0.162
11	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.287	0.237	0.215	0.195	0.162	0.135
12	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.257	0.208	0.187	0.168	0.137	0.112
13	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.229	0.182	0.163	0.145	0.116	0.093
14	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.205	0.160	0.141	0.125	0.099	0.078
15	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.183	0.140	0.123	0.108	0.084	0.065
16	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.163	0.123	0.107	0.093	0.071	0.054
17	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.146	0.108	0.093	0.080	0.060	0.045
18	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.130	0.095	0.081	0.069	0.051	0.038
19	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.116	0.083	0.070	0.060	0.043	0.031
20	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.104	0.073	0.061	0.051	0.037	0.026
30	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.033	0.020	0.015	0.012	0.007	0.004
40	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.011	0.005	0.004	0.003	0.001	0.001

Annuity Table

The present value of a $1 annuity (a continous payment)

periods	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%
1	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.690	1.647	1.626	1.605	1.566	1.528
3	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.402	2.322	2.283	2.246	2.174	2.106
4	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.037	2.914	2.855	2.798	2.690	2.589
5	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.605	3.433	3.352	3.274	3.127	2.991
6	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.111	3.889	3.784	3.685	3.498	3.326
7	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.564	4.288	4.160	4.039	3.812	3.605
8	6.733	6.463	6.210	5.971	5.747	5.535	5.335	4.968	4.639	4.487	4.344	4.078	3.837
9	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.328	4.946	4.772	4.607	4.303	4.031
10	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.650	5.216	5.019	4.833	4.494	4.192
11	8.760	8.306	7.887	7.499	7.139	6.805	6.495	5.938	5.453	5.234	5.029	4.656	4.327
12	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.194	5.660	5.421	5.197	4.793	4.439
13	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.424	5.842	5.583	5.342	4.910	4.533
14	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.628	6.002	5.724	5.468	5.008	4.611
15	11.118	10.380	9.712	9.108	8.559	8.061	7.606	6.811	6.142	5.847	5.575	5.092	4.675
16	11.652	10.838	10.106	9.447	8.851	8.313	7.824	6.974	6.265	5.954	5.668	5.162	4.730
17	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.120	6.373	6.047	5.749	5.222	4.775
18	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.250	6.467	6.128	5.818	5.273	4.812
19	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.366	6.550	6.198	5.877	5.316	4.843
20	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.469	6.623	6.259	5.929	5.353	4.870
30	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.055	7.003	6.566	6.177	5.517	4.979
40	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.244	7.105	6.642	6.233	5.548	4.997

The formulas for these two tables are:

The present value for a single $1 cash flow:

$$PV = \frac{1}{(1+i)^n}$$

Where *i* is the discount rate, and
n is the number of periods of time.

The present value for an annuity of $1:

$$PV = \sum_{t=1}^{n} \frac{1}{(1+i)^t} = \frac{(1+i)^n - 1}{i(1+i)^n}$$

Where *t* is a specific period,
i is the discount rate, and
n is the number of periods of time.

The present value for a perpetuity of $1:

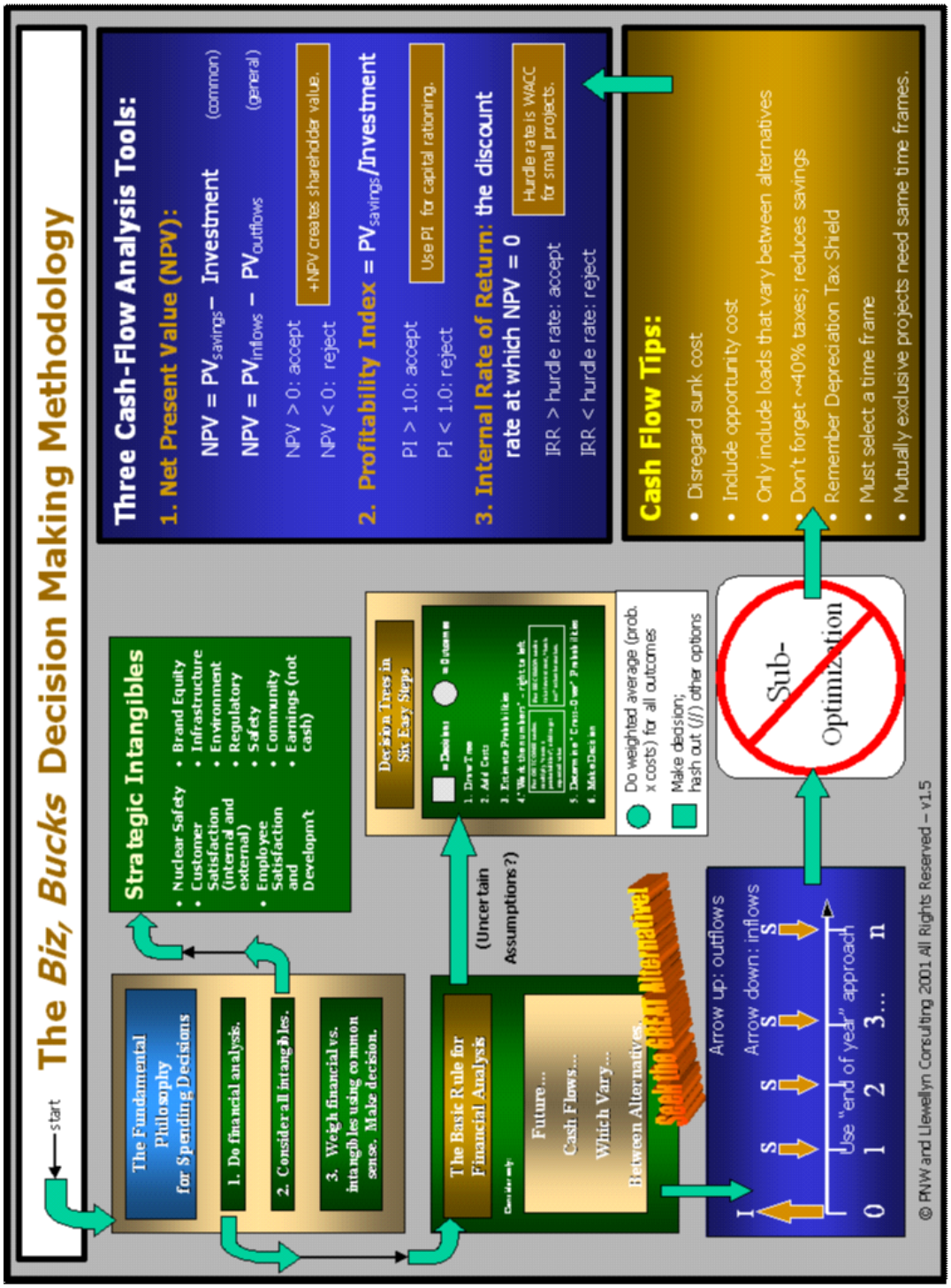
$$PV = \frac{1}{i}$$

Where *i* is the discount rate.

Appendix

B

Biz Bucks Decision Making Methodology



Present Value Tables

The present value for a single $1 cash flow:

$$PV = \frac{1}{(1+i)^n}$$

Where i is the discount rate, and
n is the number of periods of time.

Lump Sum Table

The present value of a $1 (a single payment)

periods	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%
1	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.797	0.769	0.756	0.743	0.718	0.694
3	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.712	0.675	0.658	0.641	0.609	0.579
4	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.636	0.592	0.572	0.552	0.516	0.482
5	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.567	0.519	0.497	0.476	0.437	0.402
6	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.507	0.456	0.432	0.410	0.370	0.335
7	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.452	0.400	0.376	0.354	0.314	0.279
8	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.404	0.351	0.327	0.305	0.266	0.233
9	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.361	0.308	0.284	0.263	0.225	0.194
10	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.322	0.270	0.247	0.227	0.191	0.162
11	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.287	0.237	0.215	0.195	0.162	0.135
12	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.257	0.208	0.187	0.168	0.137	0.112
13	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.229	0.182	0.163	0.145	0.116	0.093
14	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.205	0.160	0.141	0.125	0.099	0.078
15	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.183	0.140	0.123	0.108	0.084	0.065
16	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.163	0.123	0.107	0.093	0.071	0.054
17	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.146	0.108	0.093	0.080	0.060	0.045
18	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.130	0.095	0.081	0.069	0.051	0.038
19	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.116	0.083	0.070	0.060	0.043	0.031
20	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.104	0.073	0.061	0.051	0.037	0.026
30	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.033	0.020	0.015	0.012	0.007	0.004
40	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.011	0.005	0.004	0.003	0.001	0.001

The present value for an annuity of $1:

$$PV = \sum_{t=1}^{n} \frac{1}{(1+i)^t} = \frac{(1+i)^n - 1}{i(1-i)^n}$$

Where t is a specific period,
i is the discount rate, and
n is the number of periods of time

The present value for a perpetuity of $1:

$$PV = \frac{1}{i}$$

Where i is the discount rate.

Annuity Table

The present value of a $1 annuity (a continous payment)

The resultant cash flow is one year ahead of the first payment of the annuity.

periods	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%
1	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.690	1.647	1.626	1.605	1.566	1.528
3	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.402	2.322	2.283	2.246	2.174	2.106
4	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.037	2.914	2.855	2.798	2.690	2.589
5	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.605	3.433	3.352	3.274	3.127	2.991
6	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.111	3.889	3.784	3.685	3.498	3.326
7	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.564	4.288	4.160	4.039	3.812	3.605
8	6.733	6.463	6.210	5.971	5.747	5.535	5.335	4.968	4.639	4.487	4.344	4.078	3.837
9	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.328	4.946	4.772	4.607	4.303	4.031
10	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.650	5.216	5.019	4.833	4.494	4.192
11	8.760	8.306	7.887	7.499	7.139	6.805	6.495	5.938	5.453	5.234	5.029	4.656	4.327
12	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.194	5.660	5.421	5.197	4.793	4.439
13	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.424	5.842	5.583	5.342	4.910	4.533
14	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.628	6.002	5.724	5.468	5.008	4.611
15	11.118	10.380	9.712	9.108	8.559	8.061	7.606	6.811	6.142	5.847	5.575	5.092	4.675
16	11.652	10.838	10.106	9.447	8.851	8.313	7.824	6.974	6.265	5.954	5.668	5.162	4.730
17	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.120	6.373	6.047	5.749	5.222	4.775
18	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.250	6.467	6.128	5.818	5.273	4.812
19	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.366	6.550	6.198	5.877	5.316	4.843
20	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.469	6.623	6.259	5.929	5.353	4.870
30	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.055	7.003	6.566	6.177	5.517	4.979
40	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.244	7.105	6.642	6.233	5.548	4.997

Appendix

C

Final Journal of Learnings

Participants in this Biz, Bucks course will improve their retention if they review the material a few weeks after the course and transfer the main business principles ("learnings") to this journal.

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Llewellyn Consulting

Volume 7, Issue 2

2nd Quarter 2010

The Biz Bucks Quarterly

INSIDE THIS ISSUE:

Smile Time

Q. What's the difference between an in-law and an outlaw at a family reunion?

A. Outlaws are wanted!

IRS Vision Statement: "We've got what it takes to take what you've got."

You know you are in a redneck church if the name of the choir is "The OK Chorale".

The trouble with being punctual is nobody's there to appreciate it.

Word Swamp Revisit

Equity A claim on an asset. Usually refers to the owner's claim on an asset.

Cost of Equity The expected percent return for the owner's of a business.

Sesquipedalian Someone who uses big words. (Maybe this belongs in Smile Time)

Quantoid Someone who gets up in the morning looking for their first equation of the day to solve. (A *Biz Bucks* word)

Micro Economics The study of scarcity regarding individual products and services. An academic area in which there is little disagreement between scholars.

Macro Economics The study of scarcity regarding national or global issues. An academic area in which there is substantial disagreement between scholars.

A BREAK FROM QUANTOIDALISM THIS MONTH:

Comparing Valuation Tools

Departing from the usual quantoid problem in this lead article, this article summarizes the many tools available to valuate investments. Engineers, analysts, project managers should be aware of the pros and cons of each method.

The *Biz Bucks Guy* was surprised to learn during his MBA experience that there is no single perfect tool to valuate investments. The basic method taught in business schools and *Biz Bucks* training is Net Present Value (NPV), but within the NPV realm there are several versions and approaches. Also there are many other tools that exist, some close cousins to NPV and some which do not deserve "family" status to NPV. There are a few other approaches to valuation, but these listed are the ones electric energy professionals should know. Unless stated otherwise, these tools are based on time-value of money principles. They are organized by first, shareholder, and then, customer perspective. (Remember, an annuity is a set of two or more equal and sequential cash flows.)

Tools based on Shareholder Perspective

Net Present Value (WACC method) is the after-tax, discounted cash inflows minus the after-tax, discounted outflows. These cash flows are from the shareholder perspective. The NPV discount rate is risk based and reflects both equity- and debt—cost of capital, weighted by the balance sheet amount of equity and debt. Interest is NOT included as a cash flow because that return is in the discount rate.

Decision Rule: If the NPV is positive, accept the project. Negative NPV projects should be rejected.

Net Present Value (Equity Only method). Same as above except interest is included in the cash flows and the discount rate reflects only the equity cost of capital.

Both NPV methods are good for selecting alternative investments, such as Pump A vs. Pump B.

Discounted Cash Flow (DCF) is almost synonymous to NPV. The only difference is the industry that uses it (the stock valuation industry, largely). For DCR, they apply several specific concepts for determining the cash flows when a company's value is being valued. For example, a company does not plan to flare out of existence at the end of an arbitrary period of cash flows. The analyst must therefore pick a period of time to forecast cash flows (five or ten years) and then apply a

(Continued on page 3)

A *Biz Bucks Guy* Opinion

Minimum Wage Strikes Again

An axiom of microeconomics is: government price controls set below the market clearing price leads to shortages. In fact, economists assert that ALL shortages are based on government price intervention into markets. The opposite is also true. Price controls above the market clearing price always leads to surpluses. These laws hold for all products, all services, at all times, for all political parties. It is not something that can be repealed or legislated away any more than a law of physics or chemistry.

History is replete with examples. A recent one — and one of the most egregious — is the 2007 Federal law increasing the minimum wage from $5.15 to $7.25, in three stages.

The minimum wage affects the supply and demand for un-skilled workers. As government edict increases the minimum wage, previously disenchanted and unskilled workers enter the job market looking for work. This increases the supply of unskilled workers. However, those firms that employ unskilled workers find ways to reduce their dependence on them. If a small retail shop owner could afford to pay a

(Continued on page 2)

LEADERSHIP'S FIRST SKILL THINK ABOUT IT...

"[The vision] must create a sense of urgency among the rank and file of the company. If is does not energize the company, no real change is possible."

Knowing where you want the organization to go is the first skill of leadership, as taught in *Biz Bucks* training. This skill is known by many names, *vision, foresight, strategic intent, mission,* and *charter*. Regardless of the name, without it, a leader cannot be effective. The vision must have some key attributes.

1. It must create a **sense of urgency** among the rank and file of the company. If it does not energize the company, no real change is possible. John Kotter, of the Harvard Business School, in *Leading Change*, has argued that the first step of change is creating a sense of urgency.
2. The vision must be summarized into a pithy, **simple to communicate statement.** Many years ago, a car manufacturing company did this well, "At Ford, quality is Job 1," Ford was able to turn around its poor quality and has yielded dividends ever since.
3. It must be **market driven.** Many years ago, during the height of the quality movement, a street-light manufacturer set a corporate strategy to produce a "zero defect" light. After the organization rose to the occasion, spending enormous amounts of both financial and human capital, the company reached its goal and began to market the "perfect" light. The problem was no purchaser of street lights cared that a light twenty-five feet in the air was perfect. No one paid more for the perfect light. The entire strategy was a bust. It was not driven by market needs. The perfect street light took its place in the Stupid Products Hall of Fame, next to the concrete life jacket.

MORE ON MINIMUM WAGE

CONTINUED FROM PAGE 1

"Price signals are good things. They send the proper message that income and skills are related. People are motivated to take action and become self reliant."

teenager after school to sweep the floors when the hourly wage is $5.15, the shop owner may opt to sweep the floors herself if she was forced to pay $7.25. Thus, demand for unskilled workers is decreased and unemployment rises. [Unemployment can be viewed as a surplus of workers or a shortage of jobs.]

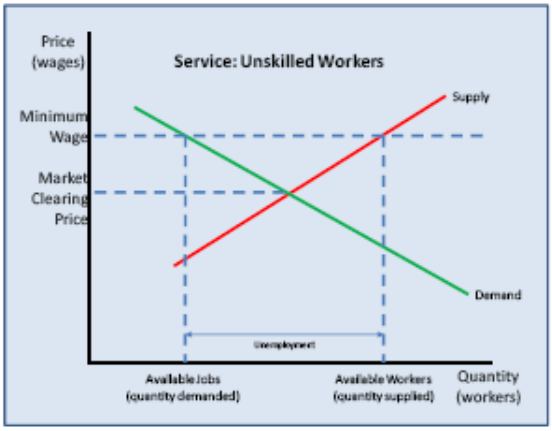
This is particularly pernicious because unskilled workers tend to be those on the lowest economic strata. This includes many minorities, the very people we should want to help out of poverty. It also affects younger people who need their first opportunity for employment, These first jobs are where many acquire a life time of good work habits.

As reported in an editorial in the Wall Street Journal (March 5, 2010, page A20), the minimum wage increase has caused havoc among the unskilled, particularly teens, and more particularly black teens.

The teen jobless rate was 14.9% when the bi-partisan bill passed in May 2007. In October 2009, a few months after the last increase, the teen rate soared to 27.6%. For black teens, the story is even more dismal, virtually doubling from 25% to just under 50%. While the government tried to provide these unskilled workers with a "living wage", the unintended consequence of this noble goal provides half of them with an income of zero!

Price signals are good things. They send the proper message that income and skills are related. People are motivated to take action and become self reliant. They school themselves. They innovate,. They work smarter and harder. They succeed and move up the economic ladder, living the American dream. Without proper price signals, people become stagnant.

The Biz Bucks Guy suggests we make the minimum wage a nice round number: $00.00. There is no need for government intervention into this unskilled worker market.



A Classic Biz Bucks Ancedote:

Foilbles in Capital Rationing

The Biz Bucks Guy has experience in capital rationing across competing organizations within a company. On occasion, he has been party to an attempt to come up with a quantitative way to rank capital projects across these organizations. He has never seen it work well. In Generation, many projects are economically justified with a few others needed for environmental or safety reasons. In the Transmission and Distribution world, many more projects are justified on strategic needs, such as customer service, regulatory requirements, and infrastructure. Attempting to devise a quantitative system to "boil down" the relative benefits of a project, both tangible and intangible, into a single priority number is fruitless. How do you compare a computer upgrade to a new pump in a power plant? Management must listen and balance the capital budget through open discussions.

"Management must listen and balance the capital budget through open discussions."

Valuation Tools (continued from page 1)

"terminal value" at the end of the period to reflect the ongoing business assumption for the company. The terminal value may be equivalent to a perpetuity or may be adjusted according to intangible considerations.

Profitability Index (PI) is the present value of the after-tax benefits divided by the initial capital cost. This tool is superior to NPV for capital budgeting purposes. It allocates scarce capital more efficiently because it is an expression of the benefits PER DOLLAR OF INVESTMENT. PI is sometimes known as Benefit Cost Ratio, however, BCR can also refer to less sophisticated (non time value of money) tools.
Decision Rule: If PI is above 1.0, accept the project. Less than 1.0, reject the project.

Internal Rate of Return (IRR) is similar to NPV, except the NPV is forced to be zero and IRR answers the question, "At what discount rate is NPV zero?". IRR has a flaw. The mathematical answer to that question is not necessarily unique. If the future cash flows have any negative numbers (such as a year with an overhaul, for example), more than one rate makes the NPV equal zero. In spreadsheets, the formula asks the analyst to GUESS the correct answer!! Then, the spreadsheet returns an accurate number close to that guess. Because of this flaw, IRR has fallen out of favor with many academics.
Decision Rule: IRR requires a IRR hurdle rate. The analyst must know what return is required to proceed with the project. Only accept the project if IRR exceeds the hurdle rate.

Levelized Cost of Energy (LCOE) is a popular method to valuate and compare the cost of generation plants. This is increasingly popular in comparing renewable generation to traditional plants and to other renewable generation. The word *Levelized* refers to doing a present value of the cost cash flows (revenues are not considered in this comparison) and then converting them to a financial equivalent annuity, thus, spreading both the upfront capital costs and the operating costs over the lifetime of the investment. That annual annuity is then divided by the energy generated annually, yielding a levelized (annuitized) cost of energy for the life of the asset.
Decision Rule: The asset with the lowest LCOE is selected.

Payback is a non time value of money tool which simply divides the total of the financial benefits over a certain time period by the initial cost. This yields a payback timeframe expressed in years. The "analyst' must first determine the time period, called the payback hurdle rate. This, unfortunately, is an arbitrary decision. There is no financial theory underpinning that selected hurdle rate. (In Biz Bucks training, we use three years to demonstrate certain rules and the problem of the arbitrary hurdle rate.)
Decision Rule: if the project pays back on or before the hurdle rate time, the project is accepted.
[Payback is generally not considered a rigorous tool for decision making. However, most people do an informal payback calculation before applying a more sophisticated tool.]

Return on Investment (ROI) is the reciprocal of Payback and is also a non time-value based tool. Instead of a time frame as with payback, ROI yield a percent. ROI requires two arbitrary numbers to make a decision: an arbitrary time period and a ROI "hurdle rate" percent. Three years is often selected as the time period. The benefits over the three years is divided by the initial investment cost to yield the ROI. That ROI is compared to the hurdle rate.
Decision Rule: if the ROI percent is greater than the hurdle rate, the project is accepted. Many HR authors have advocated the benefits of ROI to justify HR programs. This is largely an embarrassment to HR. As noted by David Ulrich, a leading HR scholar, a time-value based tool like NPV would be a better choice.

(Continued on page 4)

"Profitability Index allocates scarce capital better than NPV because it is on a Per Dollar on investment basis."

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The Biz Bucks Guy has now taught business-acumen and related principles to 4455 participants (thru December 2009)!

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CONSULTANTS TO MANAGEMENT

Biz Bucks Quarterly *is published quarterly (surprise) by Bob Llewellyn, the "Biz Bucks Guy" 1) to allow past "Biz Bucks" participants an opportunity to review the principles taught… 2) to possibly entice other unsuspecting victims into the class room…and 3) to give the Biz Bucks Guy something to do between gigs.*

The flagship courses from Llewellyn Consulting are Biz, Bucks & BTUs, *a mini-MBA for power-plant professionals and* Biz, Bucks & Bucket Trucks, *a mini-MBA for electric-"wires" professionals. Both cover all the main points of the first year of a full MBA program and some from the second year. Most examples and case studies reflect power-plant or wires situations. This five-day course covers not only accounting and finance, but strategy (development and implementation), management & organization, and the highly useful decision trees.*

Another popular course is Biz, Bucks & Blastoff, *a two-day course in financial decision making, based on days 3 & 4 of* Biz, Bucks & BTUs. *This course is designed for engineers and other technical professionals who make or recommend financial decisions. It is for those who are unable to attend the full five-day experience.*

Other courses can be tailored to clients needs, particularly for other functions like electric distribution, HR, finance & accounting, gas distribution, and nuclear plants.

VALUATION TOOLS
CONTINUED FROM PAGE 3

Tools based on Customer Perspective

In the traditional electric utility rate making environment, state regulatory commissions want decisions based on the customer perspective. The previous tools do not do that. There is a natural conflict between the two perspectives. Some companies use both types of tools and balance their decision making accordingly.

Present Worth of Revenue Requirements (PWRR) is analogous to NPV. Instead of present valuing the cash flows to the shareholder,

PWRR

PWRR present values the revenue that is required to pay for the investment. This is based on regulatory rules for rate making. That revenue stream must cover both operating costs (known as cost of service in many regulatory schemes) and the allowed rate of return for the capital portion of the investment.
Decision Rule: The lowest PWRR of a set of investment alternatives is selected as best for the customer.

Minimum Annual Revenue Requirements (MARR) is similar to PWRR in that it is based on the lowest (minimum) revenues. However, analogous to LCOE, these total costs (cost of service plus capital) are not stated in present value but are annuitized (levelized) over the life of the asset.
Decision Rule: Again, the option with the lowest revenue requirement is selected.

***

Capital Asset Pricing Model (CAPM) All of the time value based tools mentioned above are derived from a basic theory of investing known as "CAP-M". In this theory, for which Professors Markowitz,

CAPM

Sharpe, and Miller received the 1990 Noble Prize in Economics, the basis for decision making is the discount rate. In CAPM, the discount rate is calculated based on a risk premium which is added to a risk free return rate. The risk premium is a function of the typical market return for average risk investments adjusted for the risk of the investment being valued. See www.Investopedia.com (Search; CAPM) for a more detailed discussion.

Risk Premium